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June · 1955

finish

THE MAGAZINE OF

Appliance AND

Metal Products MANUFACTURING

FROM RAW METAL TO FINISHED PRODUCT

Patterson ARLCITE assures 50% (or more) reduction in grinding time.

—with

Patterson PEBBLE and BALL MILLS

Supplied with Patterson ARLCITE (high density) Linings and ARLCITE (high density) Grinding Balls, or with POROX (standard density) Linings and Balls.

High Density Linings and High Density Grinding Balls were FIRST DEVELOPED BY PATTERSON and have been in operation since 1938.

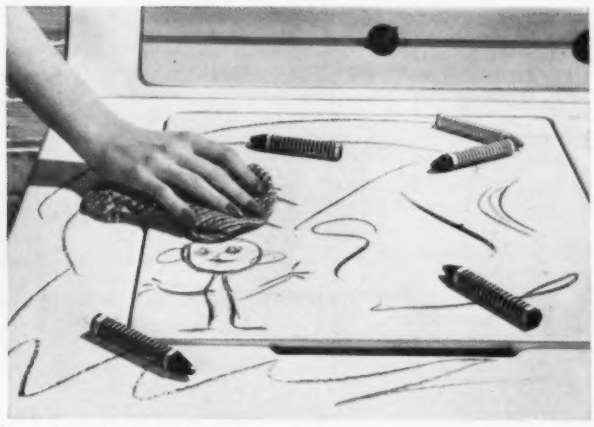
Richard L. Cameron
President

The Patterson Foundry and Machine Company
East Liverpool, Ohio, U. S. A.
NEW YORK, BOSTON, BALTIMORE, PHILADELPHIA, PITTSBURGH, DETROIT, CINCINNATI, ATLANTA, CHICAGO, ST. LOUIS, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE

The Patterson Foundry and Machine Company, (Canada) Limited
Toronto, Canada
MONTREAL

PORCELAIN ENAMEL in your products would pass all these tests...

HEAT TEST. The red-hot embers of a burning cigarette don't damage the rock-like surface of porcelain enamel. Its glistening finish does not scorch or discolor as many kitchen surfaces do.



LIPSTICK TEST. Lipstick or children's crayons won't mar the hard, lustrous finish of porcelain enamel. A damp cloth quickly wipes away stains and dirt leaving the surface bright as new.

SHOCK TEST. A hot iron is placed on an ice-cold porcelain enamel drainboard. The sudden, shocking temperature change does not affect it. Many coatings would blister, buckle or discolor.

SCRATCH TEST. Vegetables or fruits for a salad can be cut on porcelain enamel without damaging the surface. Many work surfaces show dents or scars from knives or other sharp utensils.

If you make products that might benefit from the sales advantages of porcelain enamel, why not consider this lifetime finish the next time you redesign? Then you can offer products in a range of colors that don't fade or lose luster.

Experienced job enamelers are ready to work with you—not only on design problems but in the production of porcelain enameled parts. For nearly half a century many of these enamelers have specified Armco Enameling Iron as the base metal for their products. They know it is assurance of uniform quality from one shipment to the next. That's why it has become known as the "World's Standard Enameling Iron." Just fill in and mail the coupon for complete information.

ARMCO STEEL CORPORATION, 375-B Curtis St., Middletown, Ohio

Give me names of job enamelers

We manufacture_____

Name_____

Company_____

Street_____

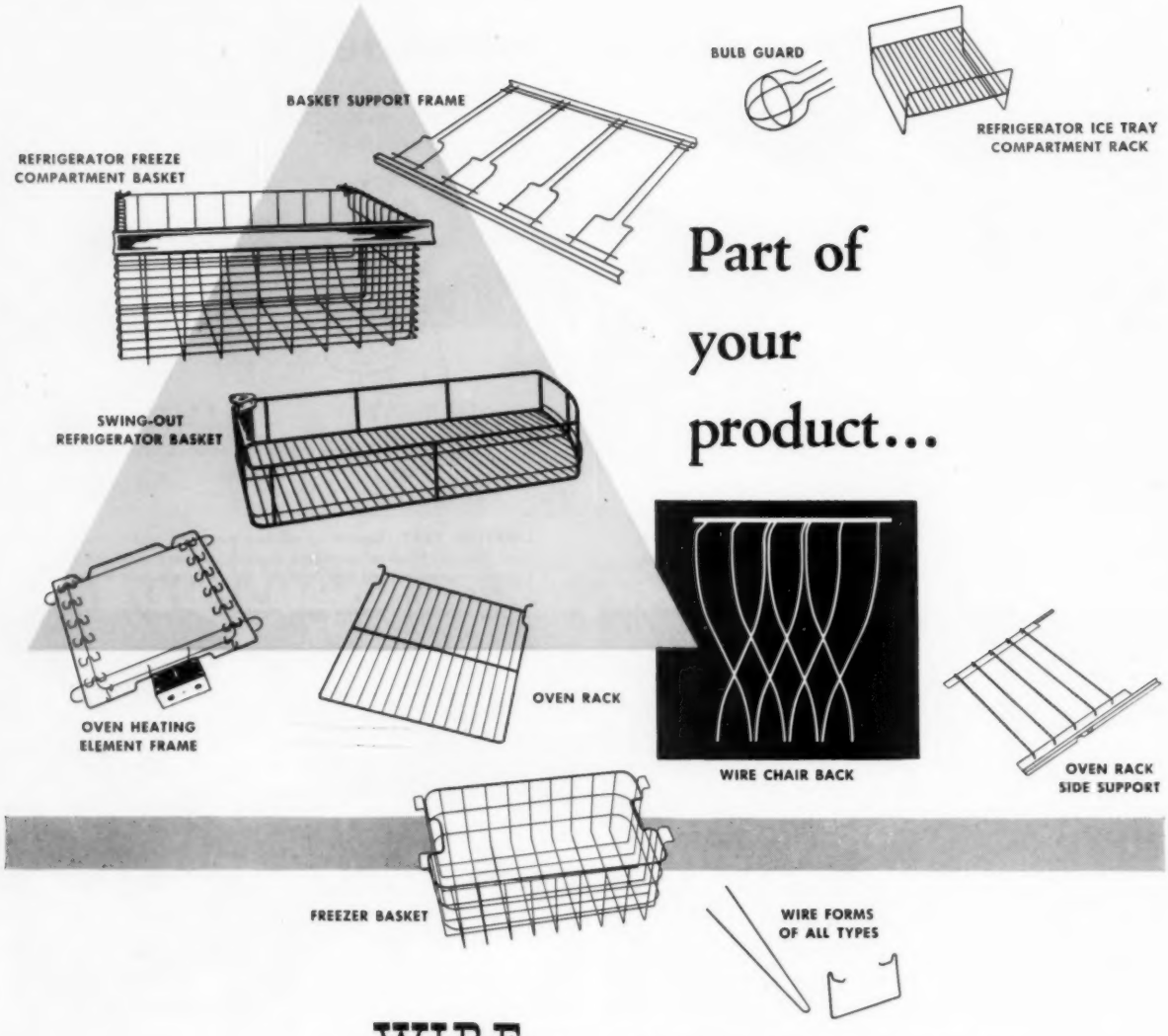
City_____ Zone____ State_____

ARMCO®

ARMCO STEEL CORPORATION MIDDLETOWN, OHIO

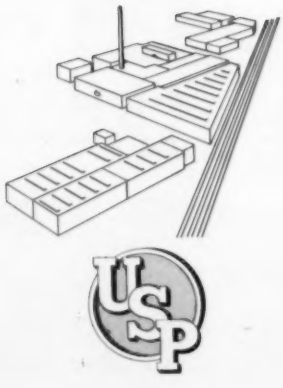
SPECIAL STEELS

SHEFFIELD STEEL DIVISION · ARMCO DRAINAGE & METAL PRODUCTS, INC. · THE ARMCO INTERNATIONAL CORPORATION



WIRE is "part of the product" in every American appliance today. Wire is the preferred material because of its manufacturing and styling versatility, its strength, its lasting beauty and sound dependability. Wire . . . welded in the desired shape and size — wire plated in the finish required is basically essential to the appeal, the sale and the continuous satisfaction of your appliance.

Why then . . . not select the one manufacturer who has specialized in producing quality welded wire products for half a century? Specify Union Steel . . . the experienced source that guarantees higher quality in every operational phase — plus on time delivery. Union Steel's engineers will gladly assist you in planning and producing a welded wire part or assembly that will make your product more efficient. *Why not call them today?*



USP

UNION STEEL PRODUCTS CO.

First Name in Welded Wire Products **ALBION, MICHIGAN**

June • 1955

VOL. 12 • NO. 6

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MONTHLY TRADE PUBLICATION

Established January 1944

Published by

DANA CHASE PUBLICATIONS

York Street at Park Avenue

Elmhurst, Illinois

Telephone • TErrace 4-5280 TErrace 4-5281

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A trade publication devoted to the interests of the metal products manufacturing industry with special editorial attention to home appliances. Includes technical and practical information on plant facilities and manufacturing problems from raw metal to safe delivery of the finished product, with special emphasis on fabrication, metal preparation, metal finishing, assembly, and packaging and shipping.

Free controlled circulation to management, purchasing, engineering and key plant personnel in metal product manufacturing plants. To others, subscription price is $5.00 per year, domestic. To all other countries $8.00 per year (U.S. funds).

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Accepted under the act of June 5, 1934, at Aurora, Illinois, authorized January 7, 1948.

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METAL PRODUCTS MANUFACTURING FROM RAW METAL TO FINISHED PRODUCT

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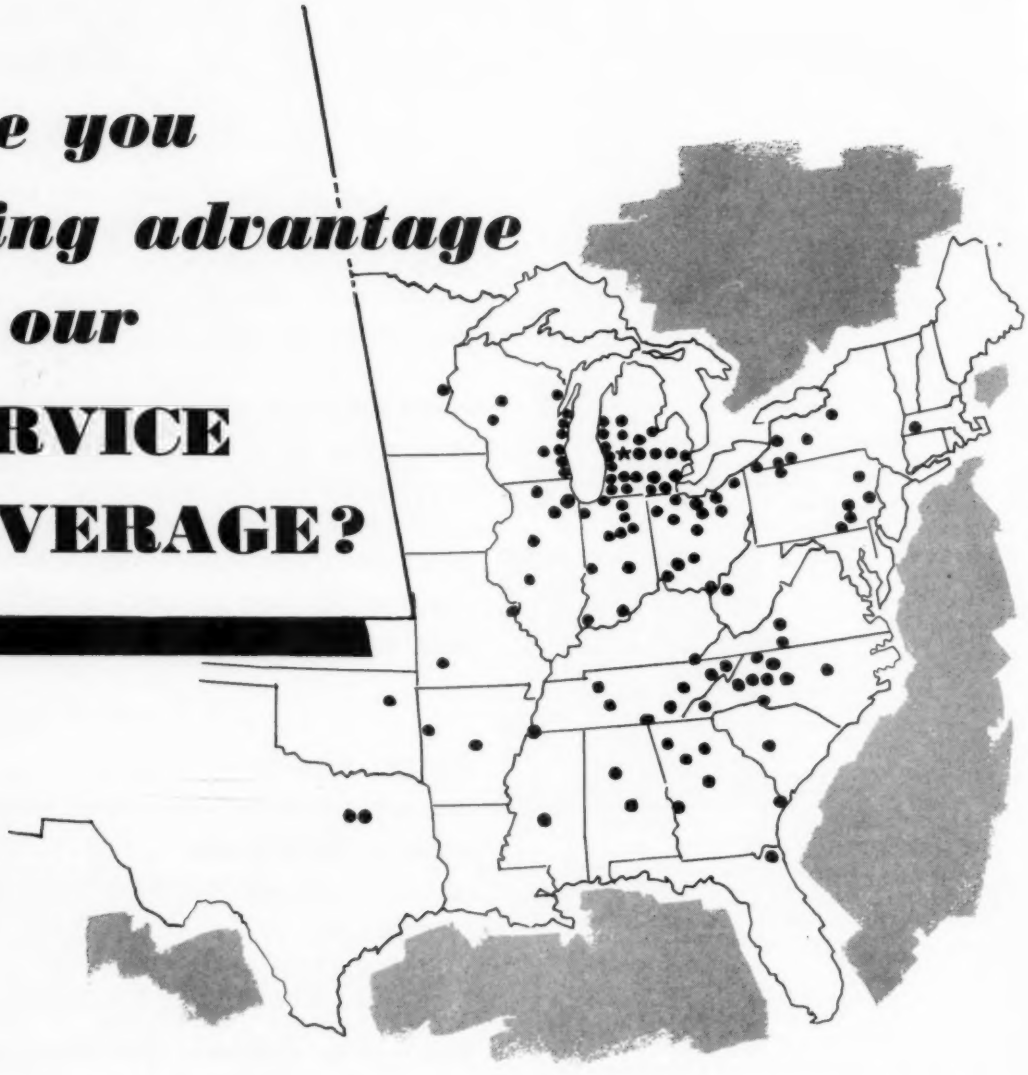
Are you taking advantage of our SERVICE COVERAGE?



Leading manufacturers in both wood and metal are currently using our custom finish recommendations and our materials in the areas shown on the map.

Our service network has already been established to serve these customers with prompt shipments and technical assistance. If you are located in this neighborhood, you are invited to enjoy the advantages of our service coverage.

The Better the Finish, the Better the Buy

GRAND RAPIDS VARNISH CORPORATION

MAKERS OF THE FAMOUS Guardsman® *FINISH AND* Guardsman® *CLEANING POLISH*

GRAND RAPIDS, MICHIGAN

Steel Stamping does it BETTER— Ackermann-Wheeling does it BEST!

Engineered Stampings

Hard-pressed manufacturers know that when it is necessary to get production out *fast*...to solve difficult production problems...call Ackermann-Wheeling!

Ackermann-Wheeling means the finest in steel stampings...stampings that give products a definite competitive edge... stampings that often cut costs, allow maximum interchangeability, save machining and drilling operations and improve product appearance.

Here you'll find every production facility: deep drawing, shearing, spot welding, arc welding, brazing, pressing, degreasing, painting. All this plus Ackermann-Wheeling vast background of experience.

Got a production stamping problem? Let Ackermann-Wheeling solve it, tool it, mass produce it, assemble it! For full details on our services, write, wire or call!

ACKERMANN MANUFACTURING COMPANY

WHEELING · WEST VIRGINIA

ACKERMANN WHEELING

A. O. Smith has played

an important part in the

progress of water heaters

...and so has Du Pont DULUX® enamel!

There's a great difference between early water heaters and the streamlined appliances on sale today! When A. O. Smith introduced its first glass-lined water heater, it was welcomed for its remarkable rust resistance, good looks and over-all contribution to modern living. And their current Permaglas model, with exclusive Heetwall and exclusive-formula glass lining, gives the modern housewife far more convenience than ever before. The demand for this new A. O. Smith water heater proves once again that continued product improvement is vital in maintaining the acceptance of the buying public.

And so it is with America's leading home-appliance finish—Du Pont DULUX Enamel! Constant research over the years by Du Pont chemists has resulted in more rugged resistance to chipping, cracking, scratching or staining... easier washability . . . longer-lasting whiteness than ever before. That's why the DULUX of today meets the most exacting requirements of *today's* topflight appliance manufacturers. E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Delaware.

America's leading home-appliance finish

. . . now in service on over 53 million major appliances!

DU PONT

REG. U.S. PAT. OFF.

"DULUX" ENAMEL

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

To our Favorite Boss!

From the receptionist at the front door through to the last man on the loading platform—*all* of us here at Great Lakes Steel have a very important *something* in common. It is the knowledge that your continued and expanded need for our products determines the future and growth of every one of us, regardless of our individual jobs here.

It is the knowledge that *you*, Mr. Customer, are the boss!

That's why we at Great Lakes are seeing to it that our steel is the kind you have a right to expect from a specialist in flat-rolled products. We know the importance of prompt shipments, top quality, proper packaging and loading, dependable information, and clerical accuracy. We think you'll agree that our many satisfied customers are a pretty good indication that this policy is good business for all concerned.

Next time you have a problem in steel, call on one of our representatives to help you solve it. You'll be glad you did!

GREAT LAKES STEEL CORPORATION
Ecorse, Detroit 29, Mich. • A Unit of
NATIONAL STEEL CORPORATION

PRODUCER OF NAX HIGH-TENSILE STEEL

SALES OFFICES IN BOSTON, CHICAGO, CINCINNATI, CLEVELAND, HOUSTON, INDIANAPOLIS, LANSING, LOS ANGELES, NEW YORK, PHILADELPHIA, PITTSBURGH, ROCHESTER, ST. LOUIS, SAN FRANCISCO AND TORONTO

1920 FERRO 1955

A business grown big through SERVICE

1938

Ferro builds 72-foot mural to promote Porcelain enamel at World's Fair in New York.

1955

Ferro sparks broader promotion of Porcelain enamel with industry-supporting campaign in Saturday Evening Post.

FERRO CORPORATION

cleveland · nashville · los angeles

IN CANADA: FERRO ENAMELS, LTD., OAKVILLE, ONT.

INDUSTRY MEETINGS

KITCHEN CABINET MFRS. MEETING

Steel Kitchen Cabinet Manufacturers Association annual meeting, The Greenbrier, White Sulphur Springs, W. Va., June 2-4.

AIR-CONDITIONING MEETING

Air-Conditioning and Refrigeration Institute, annual meeting, The Homestead, Hot Springs, Virginia, June 5-8.

APPLIANCE INST. MEETING

Institute of Appliance Manufacturers, annual meeting and suppliers' exhibit, Netherland Plaza, Cincinnati, June 6-8.

AWS WELDING SHOW

American Welding Society, annual welding show, Municipal Auditorium, Kansas City, Mo., June 8-10.

INDUSTRIAL FINISHING SHOW

American Electroplaters' Society, annual convention and industrial finishing exposition, Public Auditorium, Cleveland, June 20-23.

SUMMER MARKET

Summer Homefurnishings and Appliance Market, The Merchandise Mart and the American Furniture Mart, Chicago, June 20-30.

ASTM ANNUAL MEETING

American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N.J., June 26-July 1.

NATIONAL HOUSEWARES SHOW

National Housewares and Home Appliance Manufacturers Exhibit, Auditorium, Atlantic City, July 11-15.

HOME LAUNDRY SUMMER MEETING

American Home Laundry Manufacturers' Association, summer meeting, The Homestead, Hot Springs, Virginia, July 17-19.

ENAMELERS SHOP FORUM

Porcelain Enamel Institute, annual shop practice forum, Ohio State University, September 14-16.

PACKAGING-HANDLING SHOW

Society of Industrial Packaging and Materials Handling Engineers, annual packaging and materials handling show, Kingsbridge Armory, New York City, September 20-22.

TRIPLE PRODUCTION SHOW

Metalworking Machinery and Equipment Exposition, The Coliseum, Chicago, September 6-16.

Production Engineering Show, Navy Pier, Chicago, September 6-16.

Machine Tool Show, International Amphitheatre, Chicago, September 6-16.

PAINT FEDERATION MEETING

Federation of Paint and Varnish Production Clubs, annual meeting and show, Hotel Statler, New York City, October 3-5.

WORLD PLASTICS FAIR

World Plastics Fair and Trade Exposition, National Guard Armory, Exposition Park, Los Angeles, October 5-9.

AGA CONVENTION

American Gas Association, annual meeting, Los Angeles, October 17-19.

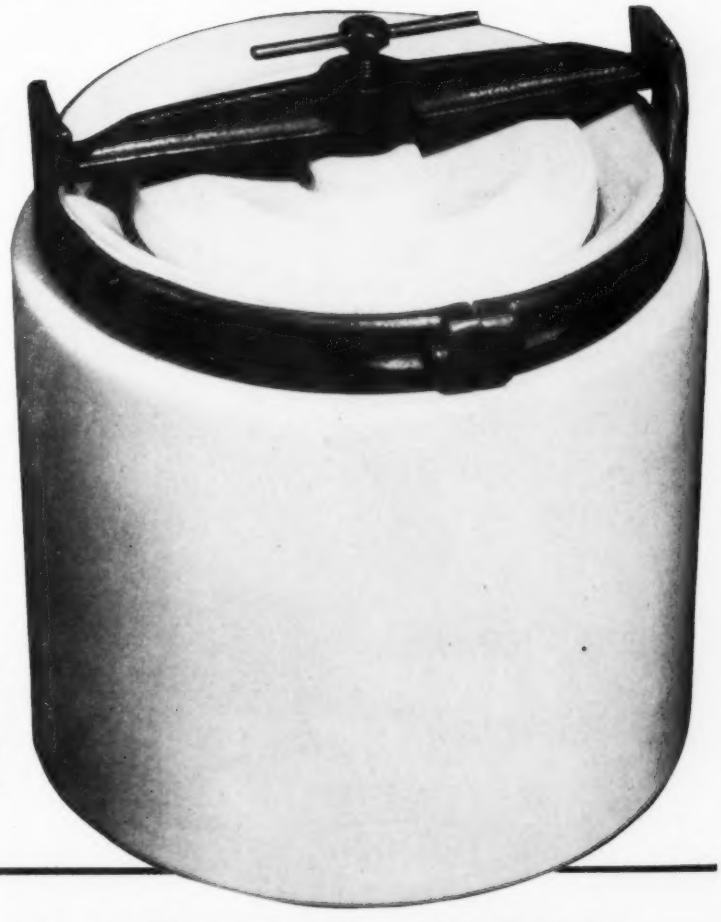
PEI ANNUAL MEETING

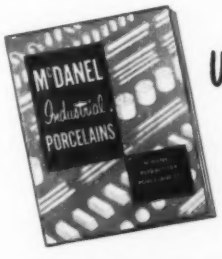
Porcelain Enamel Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va., October 26-28.

McDANEL

BRINGS YOU A *New* CERAMIC LABORATORY MILL JAR!

● Here is the new, 1-gallon McDanel Laboratory Mill Jar (PRJ-1G). It has been designed with recessed bronze hardware to prevent catching or holding on roller-type mills. This new McDanel Jar has a smooth, long-wearing, high-grade ceramic body . . . can be easily and quickly cleaned, inside and out. The close-fitting cover rests on a soft rubber gasket and can be tightened by hand without cracking or damaging the cover. There is no leakage. Neoprene gaskets should be used for oil base grinding. Investigate the McDanel PRJ-1G Laboratory Mill Jar now.





Write for Your McDanel Industrial Ceramic Catalog TODAY! Gives complete information on Balls, Mill Lining, Mill Jars, Jar Mills, Special Ceramics, etc.

McDANEL *Industrial* PORCELAINS

McDANEL

REFRACTORY PORCELAIN COMPANY

BEAVER FALLS · PENNSYLVANIA

Our Proving Grounds

are the added plus that enables us to make good on our claim of Better Frits

IN our laboratories top flight Ceramic Engineers carry on continuous exhaustive research and tests which have resulted, thru the years, in notable advancements and improvements of Frits.

perfect conditions prevail in laboratories

It has to be recognized that the almost perfect conditions prevailing in a laboratory test cannot be achieved under practical working conditions.

that's why our Proving Grounds pay off

Here at Ing-Rich our ceramic engineers have the tremendous advantage of day in and day out contact with our large enameling plant . . . where we both enamel our own products and do a large job enameling business.

That's why Ing-Rich Frits will give you higher uniformity, lower rejects. Our ceramic engineers can and do follow the results obtained in the laboratory right down our production lines . . . not occasionally, but day in and day out.

Ing-Rich FRITS are "Plant Tested." The result of that highly desirable and rare combination of science and practical experience.

ING-RICH
FRIT
"The Plant Tested Frit"

INGRAM-RICHARDSON, INC.

OFFICES, LABORATORY AND PLANT • FRANKFORT, INDIANA

THE finish spotlight

Motion picture and television star Gracie Allen is shown preparing hubby George Burns' breakfast toast with the new 3-slice Toastmaster toaster on one of her recent network TV shows. The 3-slice toaster, designed for large families or for the preparation of club sandwiches, is the latest in the company's new line which features modern functional, compact design.

Try Century Vit
TITANIUM WHITE

1. COLOR STABILITY
2. HIGH REFLECTANCE
3. HIGH OPACITY
4. GLOSS
5. TEXTURE
6. WORKABILITY

With Century Vit Titanium cover coat over Century Vit ground coat enamel you have an unbeatable combination for adding beauty and durability to your appliance or other metal product.

Century frits are *time proved* in production plants before they are sold to you. The titanium frits give you the six characteristics: color stability, high reflectance, high opacity, gloss, texture and workability, so important to your plant and finished product.

Then too — you will save money 1) in frit cost and 2) on the production line.

A Century field engineer can show you how to improve your product and save money too if you will let us hear from you now.

FRIT from CENTURY
FRIT MASTERS

CENTURY VITREOUS ENAMEL COMPANY

• 6641-61 S. Narragansett Ave., Chicago 38, Ill. •

DOW CORNING CORPORATION

Silicone News

FOR DESIGN ENGINEERS

Founder Celebrates 25 Years' Service To Silicone Industry

In 1930, Dr. J. F. Hyde first started his investigations into the field of organosilicon chemistry. His work, which preceded that of any other chemist in this country, led to the first commercial production of silicones.

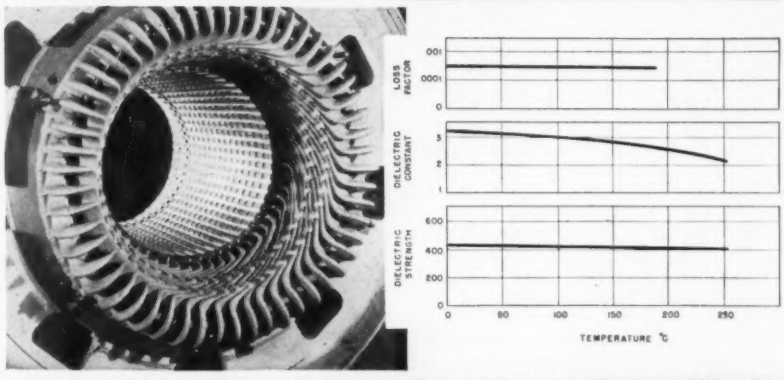
Frank Hyde received a master's degree in chemistry from Syracuse University in 1924. He then enrolled in the graduate school of the University of Illinois and received his Ph.D. in organic chemistry in 1928. To pursue still further his interest in basic organic chemistry, he spent two years as a post Doctorate Fellow at Harvard University under Dr. J. B. Conant.

DR. J. F. HYDE

Hyde's work in the field of silicone chemistry began the day he was hired by Dr. E. C. Sullivan of Corning Glass Works in 1930. His first project was to explore the possibility of incorporating organic chemical groups into glass compositions to increase their shock resistance and flexibility. His investigations led deep into the work done by Prof. F. S. Kipping of Nottingham University (England) in the field of organosilicon chemistry. Applying his creative imagination to Kipping's findings, Hyde produced silicone polymers with the very properties that so rapidly propelled the silicones into almost every phase of American industry.

Frank Hyde carried on basic exploratory work in the silicone field at Corning until 1951. He then transferred his laboratory to Midland, Michigan, to be closer to actual silicone operations at Dow Corning Corporation where he continues to apply his research ability to producing more and better silicone products.

At this time, many people join us in saying,
CONGRATULATIONS TO THE MAN WHO WAS FIRST IN THE WORLD TO PRODUCE A USEFUL SILICONE AND ON WHOSE WORK AN INDUSTRY WAS FOUNDED
DR E C SULLIVAN



ALLIS-CHALMERS ANNOUNCES ALL-SILICONE-RUBBER INSULATION FOR LARGE MOTORS AND GENERATORS

Allis-Chalmers Manufacturing Co. has announced development of the first all-silicone-rubber electrical insulating system for large motors and generators. Known as Silco-Flex, this new Class H insulation increases the life and efficiency of rotating electric machines by providing greater overload protection and maximum resistance to abrasion, moisture, shock, and vibration.

Made with Silastic*, the Dow Corning silicone rubber, Silco-Flex is dielectrically superior to all types of resinous insulations. As shown in the figure, dielectric strength of 1/16 inch slabs cured 24 hours at 250 C remains practically constant over a temperature span ranging from 0 to 250 C. Dielectric constant decreases gradually from 3.2 to zero to 2.2 at 250 C.

In manufacturing Silco-Flex insulated stator coils, Silastic is applied to the conductors and vulcanized into a homogeneous mass by the application of heat and pressure. This produces a continuous and impervious dielectric barrier which provides a flexible, moisture and heat resistant wall over the entire coil structure including leads.

Silco-Flex insulation is expected to change many of the motor application practices in the utility and industrial fields. In power plant induced draft fan motors, for example, the abrasive effect of atmosphere-borne cinder and fly ash will have little effect on the resilient all-silicone-rubber system. Motors in cement, ore crushing and similar installations will retain high overload capacities despite reduced ventilation resulting from dust accumulation in ventilating passages. In the chemical, paper, food and similar industries, applications that formerly required totally enclosed motor frames may now be supplied more efficiently and economically with Silco-Flex insulated semi-protected or open type frames.

Allis-Chalmers is already building large Silco-Flex insulated machines in the 2300 and 4000 volt class. These will be priced on the same basis as pervious units constructed with resinous Class H insulation. A-C engineers also expect to extend the advantages of the all-silicone-rubber system to a wide range of high and low voltage rotating equipment. ***No. 41***

*T.M. REG. U.S. PAT. OFF.

Design Edition 10

DOW CORNING CORPORATION - Dept. 5306
Midland, Michigan

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TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

ATLANTA • CHICAGO • CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEW YORK • WASHINGTON, D. C. (Silver Spring, Md.)
Canada: Dow Corning Silicones Ltd., Toronto; **Great Britain:** Midland Silicones Ltd., London; **France:** St. Gobain, Paris

Temperature Control of Top Surface Cooking Smash Sales Hit of '55

Every Woman Wants It!
Greatest Traffic-builder Ever!

You're way ahead in electric range selling with this year's models — ahead in sales features that are making new sales records everywhere. Range manufacturers are giving you more to sell — more to demonstrate — more to ring up sales and profits! Top of selling "hit-parade" is the new, top-element control that senses the temperature of cooking foods, controls heat to end once and for all the mess of burned foods, boil-overs and charred utensils.

Robertshaw® ELECTRIC
"THERMAL EYE" Top-Element Control
Prevents Over-Cooking, Protects Utensils!

Heart of this news-making development is the automatic sensing device located in the center of top elements. It "takes the temperature" of cooking foods automatically — prevents over-cooking, saves work — no more scorched utensils. Sold to range manufacturers under the name "Thermal Eye", you'll find this marvelous "built-in brain" on many of the new electric ranges — designed and engineered to the highest standard of quality by Robertshaw-Fulton, leading manufacturer of controls for appliances.

Robertshaw® **THERMAL EYE**® **TOP-ELEMENT CONTROL**

by Robertshaw-Fulton CONTROLS COMPANY

Robertshaw Thermostat Division • Youngwood, Pennsylvania
Robertshaw-Fulton Controls (Canada) Ltd., Toronto

report from Natal

Gentlemen:

Could you advise us of the headquarters of the Liquefied Petroleum Gas Association as we are very anxious to join same?

May we say how much we enjoy receiving *finish* magazine each month, and find same of tremendous value, both from the products advertised and the interesting production articles.

C. W. Ferguson
Director
Durban Falkirk Iron Co., Ltd.
Jacobs, Natal

LPGA maintains offices at 11 South LaSalle Street, Chicago 3, Illinois. — Eds.

---

interest in "cermets"

Gentlemen:

I am interested in an article by A. Pechman on "Cermets — Possible Answer to Ultra-High Temperatures" which appeared in *finish*, Vol. 10, No. 12. Would you please send this magazine to me or a photostatic copy of the article?

Dr. Leo Nast
Director — Plastics Research
Bellanca Aircraft Corporation
New Castle, Delaware

Mr. Pechman, of Ryan Aeronautical Co., also authored "Cermets and Ceramic-Coated Metals Team Up with Jet Propulsion", *finish*, Vol. 11, No. 7.—Eds.

Re: possibility of merger between SIPMHE and AMHS

Gentlemen:

There have been recent reports that the Society of Industrial Packaging and Materials Handling Engineers (SIPMHE) and the American Material Handling Society (AMHS) are considering merging. In view of the rather widespread circulation of these reports, SIPMHE's National Officers have authorized me to write this letter outlining the official view of our Society in this matter. It is important to note that until now no official statement has been made by this Society.

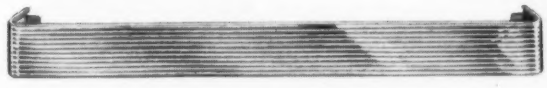
We, the National Officers and Directors of SIPMHE believe that the

to Page 116 →

Follow the trend
to BRASS and COPPER
with PYRAMID mouldings

Brass for Bright Living

New life and brightness is given to many products by the simple addition of tastefully placed *colored mouldings*. Above a single band of brass has been added to an air conditioner. Smart styling — *smart* because it *means more sales*.



Copper comes to Kitchens

A swirl of copper highlights this refrigerator door and at the base, a bold copper kick plate. Both brass and copper mouldings are available with *clear protective coatings*. Take advantage of PYRAMID'S experience with these *sales making metals*. Write today for your "Plan Book of Metal Mouldings."

Pyramid Mouldings Inc.
5365 WEST ARMSTRONG AVE., CHICAGO 30, ILL.
NEW YORK...CALIFORNIA

SEND FOR YOUR FREE COPY OF
"PLAN BOOK OF METAL MOULDINGS"

No one connected with the design or manufacture of any appliance should be without a copy of this book containing hundreds of standard and special mouldings. Send for your free copy today.

Without obligation, please send copy of "Plan Book of Metal Mouldings." F 6

Name_____ Title_____

Firm_____

Address_____

MACCO MACHINE CLEANER NO. 71-D

a phosphate cleaner and rust inhibitor

GIVES BETTER PAINT ADHESION

71-D prevents rust spread and rust blisters

A MACCO CASE HISTORY*

As in all fields today, purchasers of metal products are constantly demanding more and more in the quality of their paint finishes.

By far the most efficient and economical method of preparing metals for the finest and most enduring paint job is by use of Macco M.C. No. 71-D. Laboratory and shop tests prove that, on steel, cast iron, aluminum or die cast, Macco M.C. No. 71-D provides a corrosion-resistant phosphate coating comparable in quality to that formerly available only through expensive and elaborate methods of preparation.

TESTED ADVANTAGES OF MACCO M.C. No. 71-D CLEANER

1. Cleans soil from metals and etches in one operation.
2. More economical because of longer life of solution.
3. Gives microscopic phosphate coating, greatly aiding in paint adhesion and corrosion resistance.
4. No special equipment required.
5. Never hardens in the drum.
6. Gives excellent protection against rust prior to painting.
7. Simple to control solution.
8. Can be run in conventional one, two, or three stage washers, as well as in other types.

Use Macco M.C. No. 71-D Cleaner and Phosphate Coating and add immeasurable quality to the finish of your product.

*Actual case history, names, etc. can be had by writing today to

LEADING METAL PROCESSORS
indorse its use for . . .
- CAMERAS
- TAPE RECORDERS
- TV CABINETS
- LAWN FURNITURE
- APPLIANCES
- MOLDING
- TOYS, Etc.

Makers of Better Metal-Working Compounds Since 1931

MACCO PRODUCTS COMPANY

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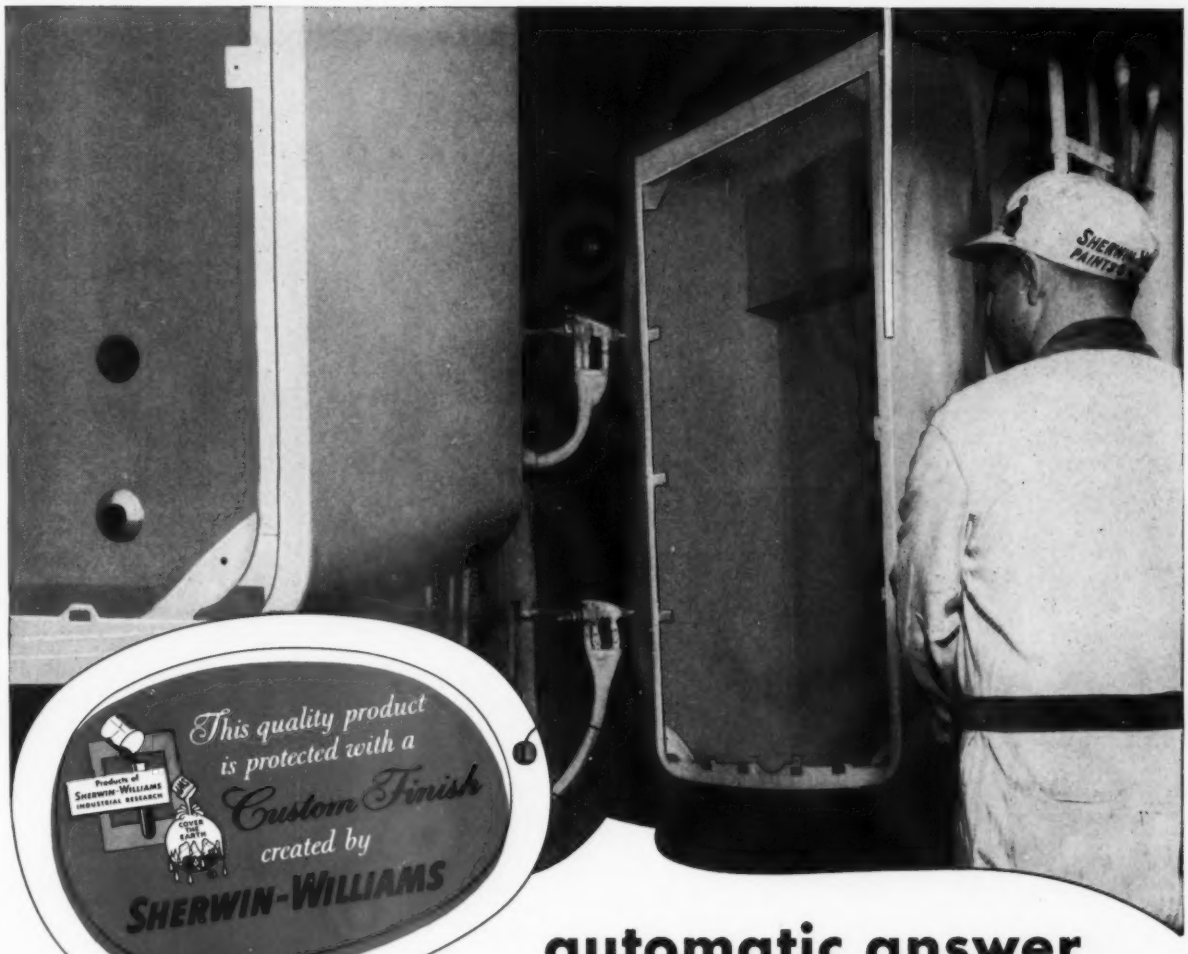

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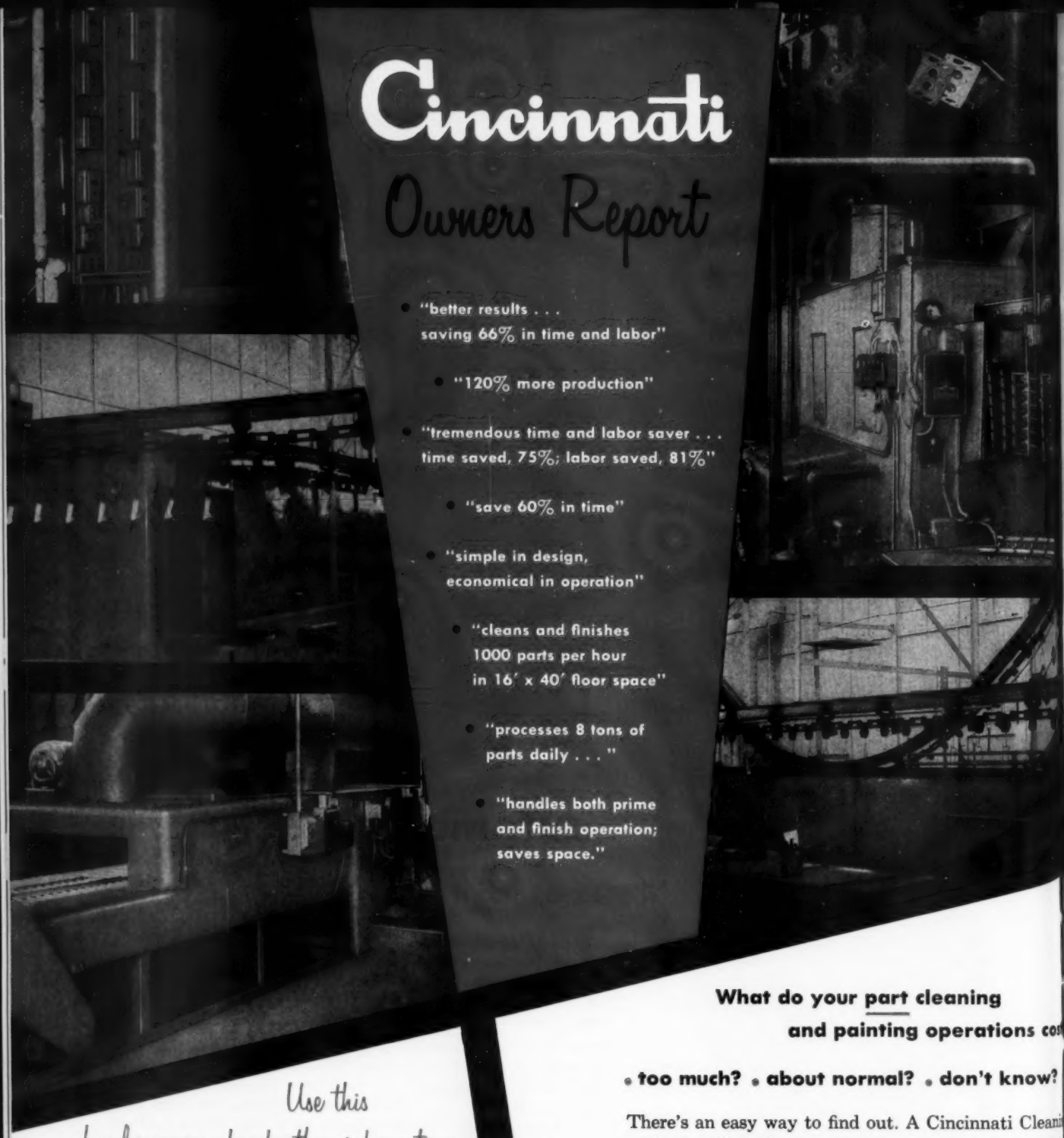

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- "save 60% in time"
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- "cleans and finishes 1000 parts per hour in 16′ x 40′ floor space"
- "processes 8 tons of parts daily . . . "
- "handles both prime and finish operation; saves space."

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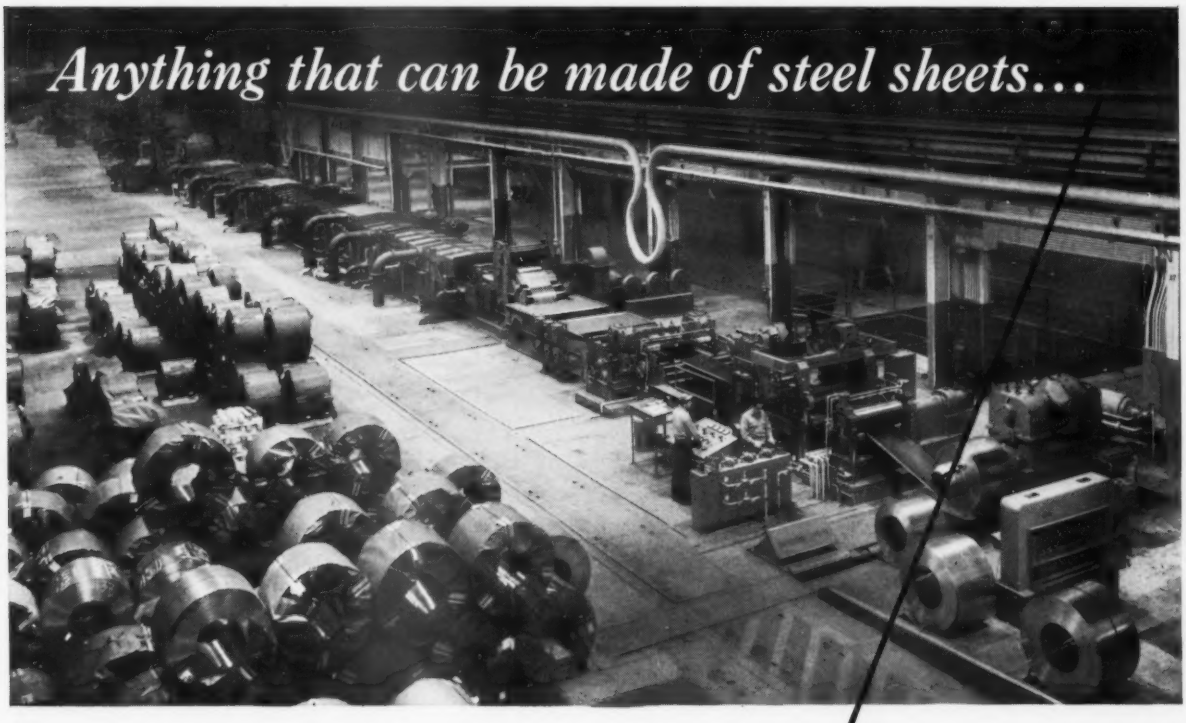
Anything that can be made of steel sheets...



You are looking in on a miracle of modern engineering... Wheeling's new continuous galvanizing line, built at a cost of over $3,000,000.

The end result is SOFTITE, the galvanized sheet with the tightest zinc coating yet produced... so tight it won't flake or chip no matter what you do to it. So tight, you can use Wheeling SOFTITE to make anything that can be made of steel sheets.

That's SOFTITE... *Wheeling* SOFTITE... made by the company that led with the development of COP-R-LOY, the original copper-bearing steel pipe, then perfected DUCTILLITE, the original cold reduced tin plate which revolutionized the tin plate industry, and opened new fields to the can maker and packer. Now, SOFTITE... acclaimed the best galvanized sheet yet produced—so good, in fact, that because of the unprecedented demand, Wheeling has been forced to triple its production facilities in 1955. SOFTITE, a product of Wheeling Steel Corporation, Wheeling, West Virginia.

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galvanized sheets

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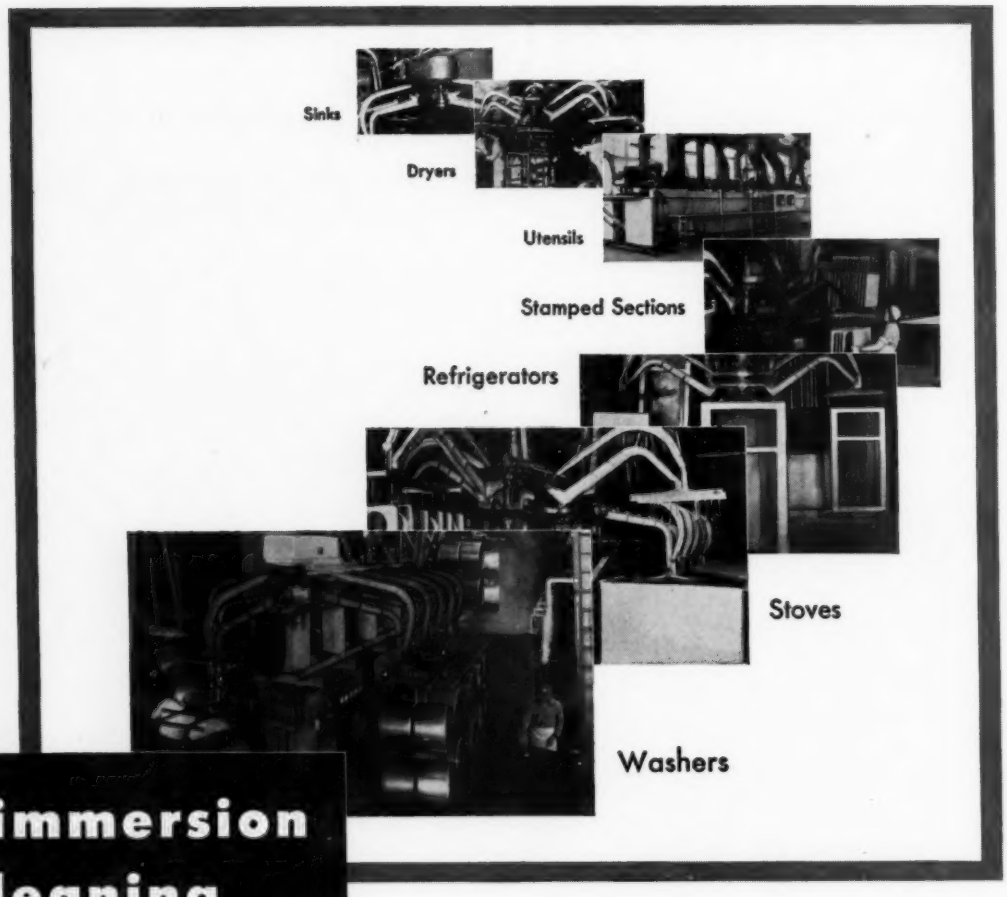

For immersion cleaning and pickling

vitreous enameling processors choose . . .

STEVENS *VARI-MATIC* MACHINES

Manufacturers of vitreous enamelware know that careful choosing of the right manufacturing methods and equipment paves the path to profit. That's why so many use Stevens machines for immersion cleaning and pickling of their ware.

Stevens equipment is available for cleaning and pickling products ranging from small pans to refrigerator assemblies. Mechanically flexible, Stevens machines are easily altered for increased output during plant growth. Their simplified construction offers uninterrupted production. Among other features of Stevens machines that delight production manager and cost accountant alike are:

1. Tremendous work output at low per square foot cost.
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3. No scratching or marking.
4. Extremely low acid and cleaner drag-out losses.
5. Minimum number of high cost racks or carriers required.
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7. Electrical horsepower requirements held to a minimum.

If you process metals, Stevens will design a machine to help you increase production and cut costs. Let us show you the facts. Call a Stevens Sales Engineer or write Stevens direct.

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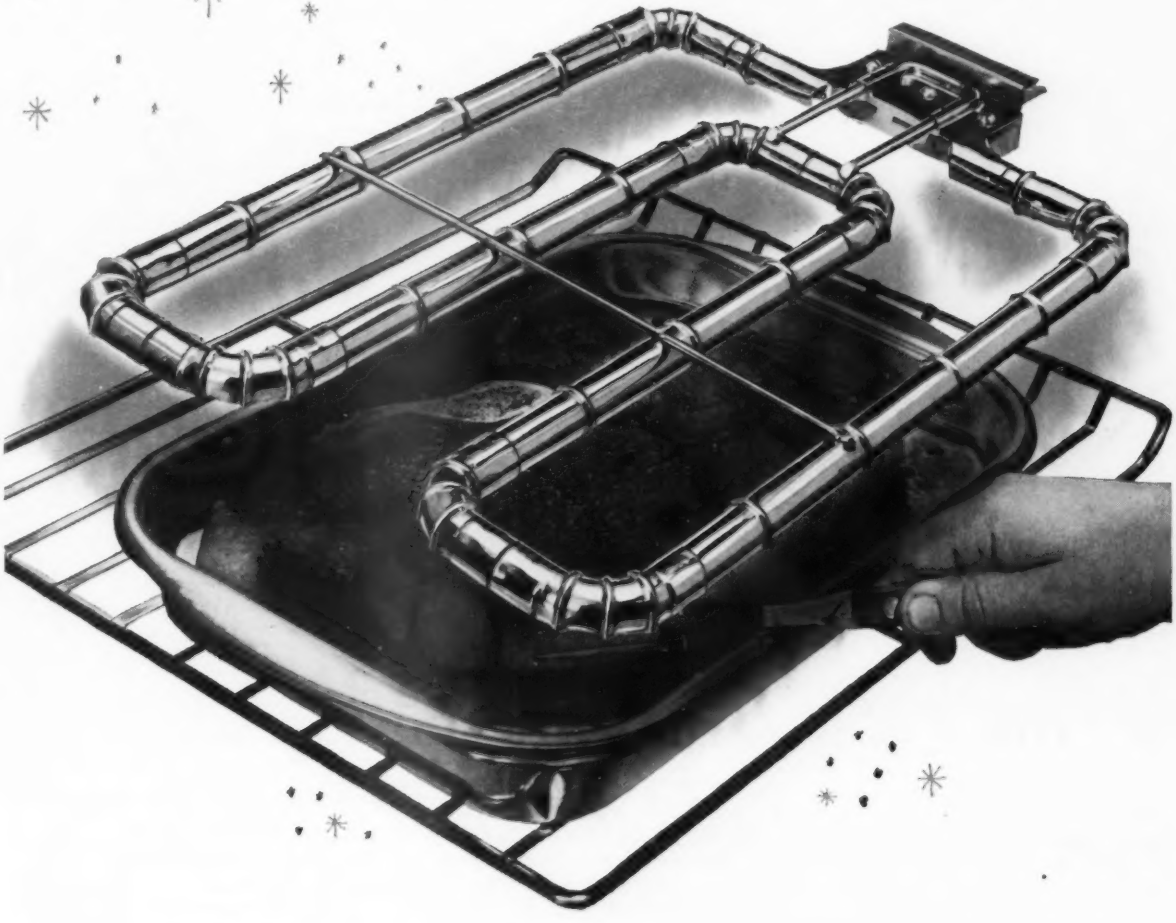
Man, oh Man!
...what a BROILER!



Ferro's *Reflectube® Broiler Units* are ready . . . and what a job they will do for you in adding *extra* sales appeal to your 1956 electric ranges.

The exclusive *Reflectube* construction concentrates the heat where you want it—on the food being cooked. Yet, it's a *diffused heat,* due to air turbulence produced by the unit's design. The result is really "something", closely approaching charcoal broiling.

We want you to see it, try it, then taste the food that comes out. We've set up a test kitchen in Chicago to conserve your time. And may we suggest you hurry? This product is *hot.* Write, wire or phone for a demonstration!

FERRO

FERRO ELECTRIC PRODUCTS, INC.

A Subsidiary of Ferro Corporation

KIRKLAND, ILLINOIS

The Facts Stood Me on My Ear!

"When I found out from the Detrex field representative that the average metalworking plant had ¼ to ⅓ of their operations tied up in metal cleaning and surface preparation, I was astonished to say the least! It started me thinking as to just what percentage of *our* operations were of that type. I found that in our plant nearly a third of all the operations had to do with metal cleaning and surface preparation. That fact not only stood me on my ear but it changed my thinking completely regarding the importance of these operations.

"The Detrex man pointed out many dollar-saving improvements we could make. For example, take degreasing solvent. Detrex Perm-A-Clor* is saving us hundreds of dollars per year because it goes further. Why? Because it's a premium solvent and at the price of regular solvent too! He also showed us ways to conserve solvent, improve product quality and even helped us train operators. He did all this without charge too!

"Maybe you're like me. Perhaps you have never stopped to consider the number of metal cleaning and surface preparation operations in your plant, or the money you might save from an overall standpoint. If not, the facts will probably startle you.

"Why don't you give the Detrex man in your area a chance to make a survey of your plant? Chances are you'll be surprised at the result. It won't cost you a cent and he may prove he can save you big money. Give it a whirl . . . you've got everything to gain . . . nothing to lose."

**Detrex Perm-A-Clor (trichlorethylene degreasing solvent) costs no more than ordinary solvent, yet it goes much further . . . far more parts degreased per pound. You can buy Perm-A-Clor in the manner most economical for your needs . . . by the drum, by tank truck or by tank car. A nationwide network of distribution and supply points provides fast delivery at all times.*

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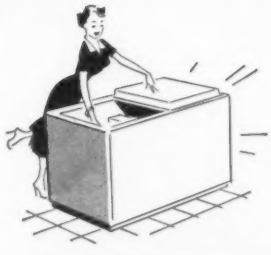

THE WEATHER:

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THE FINISH:

Nubelite*—for Lasting Performance

In this humidity room, NUBELITE-finished refrigerator and freezer panels get an accelerated torture test to make sure the finish will stand up in the home.

Leading manufacturers use NUBELITE formulas that provide maximum humidity resistance while also providing the other properties required for satisfactory service life and appearance.

NUBELITE formulas incorporate the specific resistance properties required by the nature and function of each particular product.

Manufacturers are invited to call on Glidden Technical Service with problems of surface preparation and film application for any product.

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Development laboratories—*at the new Westinghouse air conditioning plant consist of a number of large rooms isolated from each other by insulated masonry walls. Here any probable combination of temperature and humidity can be reproduced. Technician shown in photo is in one of the test chambers measuring distance between test unit on left and recording apparatus on the right.*

Producing air conditioning units for home and commercial use

new Westinghouse plant features automatic equipment, sound test "room within a room", an exacting quality control program, and many other up-to-the-minute features

A COMPLETELY new plant for the production of air conditioning units was opened to the press recently at Staunton, Virginia, by Westinghouse Electric Corp. Designed as a single purpose plant, the new facility includes interesting automatic equipment, and features for materials handling, fabrication, finishing and testing that will be of interest to all who produce appliances and other allied fabricated metal products.

Shearing, blanking, forming welding of panels and frames

A five-ton overhead crane moves steel from the storage area onto mobile hydraulic tables. At the shears the height of the tables can be adjusted to proper working level to perform the shearing operations.

From the shears the material is transported by mobile hydraulic tables and lift trucks to the blanking and forming presses. These presses range from 35 to 400-ton with bed capacities up to 60 by 96 inches and brakes of one-quarter inch by 12 feet, 240-ton capacity. These are used to blank, pierce, notch and form the various panels and frame parts for the units. The presses and brakes are located so that parts are processed operation to operation. Once the initial operation is started on a panel or frame part, it is processed through the equipment to completion, including the spot welding and welding operations required.

The fabricated parts for frames are processed through the machines in the same manner previously described for the panels. They are then transported by lift truck to the welding area where the parts are positioned in the storage racks within reaching distance of the assembly operator. The parts are positioned in welding jigs and held in positive position by air clamps which simultaneously apply pressure at all points required for the proper holding of the parts. The arc welding operation is performed and the completed frame removed from the fixture.

Material handling

The panel line consists essentially of a chain-type conveyor approximately 950 feet long, with trolleys on two-foot centers. The frame line is the same type of conveyor but 575 feet long. The conveyors, with a normal speed of eight feet per minute, are so arranged that each may be operated independently, but will be automatically synchronized when operated together, regardless of the speed setting. This is accomplished by a common caterpillar single drive unit powered by a 2 hp, 1200 rpm motor through a mechanical belt-type transmission. The output shaft on the transmission is connected to a jack shaft containing two electric clutches controlled by the respective line push-buttons. The drive may be manually controlled to adjust the speed.

Panel and frame finishing

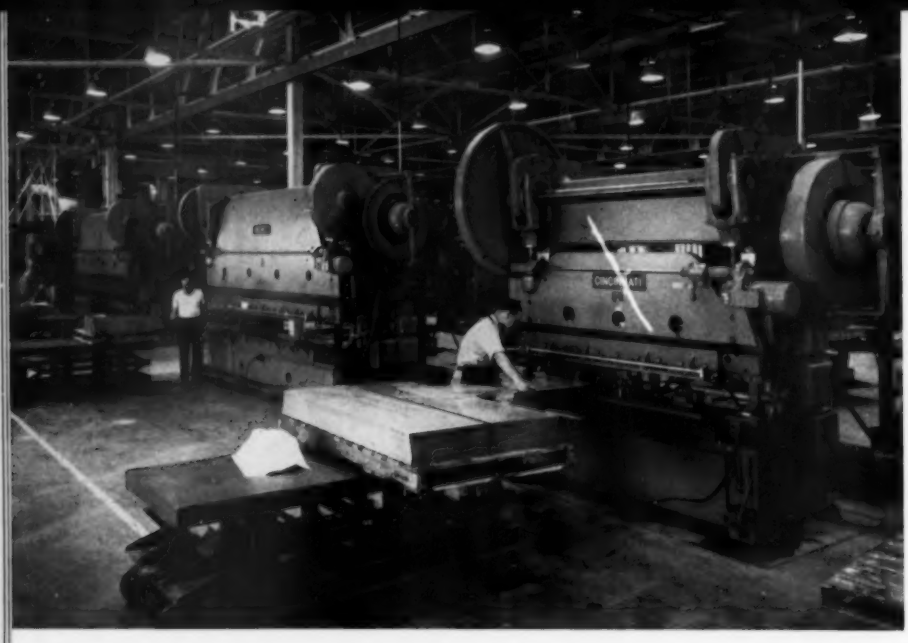
In developing methods and equipment for the new plant, the question of rust protection and finishing of the frame and exterior panels was given serious attention. The problem was to secure a system which would give greater rust protection to these parts, improve the quality and durability of the finish and reduce the handling and processing time, as well as reduce the costs of the finishing system previously used.

After considerable evaluation of various methods and processes, it was decided to finish the frames by phosphatizing as a complete unit after all fabrication and welding was completed and then applying a coat of lacquer (black or grey) with hot spray equipment. The exterior finish panels were also to be phosphatized and then hot sprayed with a synthetic baking type primer on the interior surfaces, and a hot sprayed synthetic alkyd melamine type baking enamel on the exterior surfaces. This gives good rust inhibition, excellent paint film adhesion, adequate film thickness due to the hot spray method, and superior film resistance to abrasion and alkali resistance, together with good flow out and gloss characteristics.

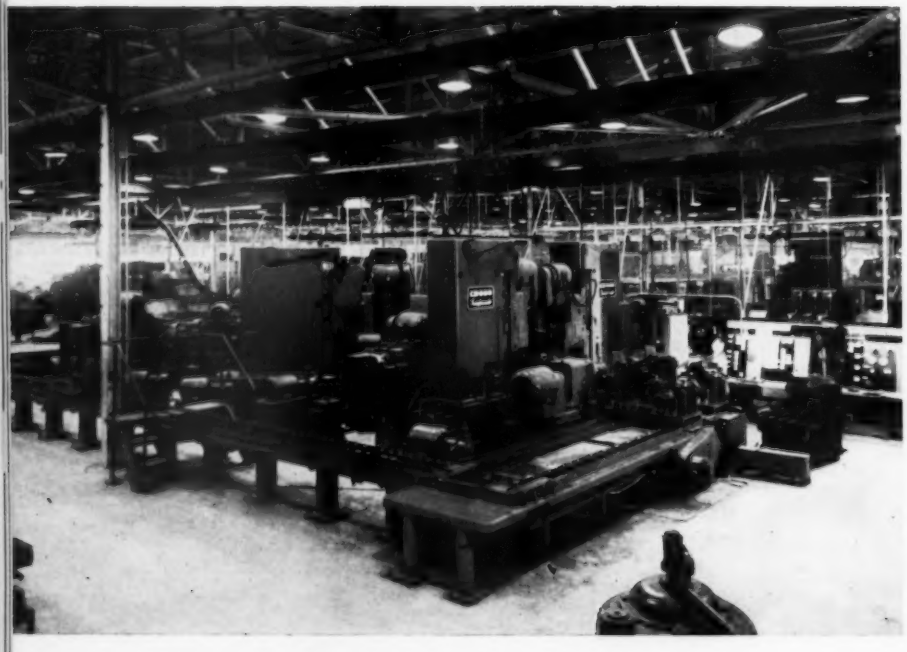
Production capacity was set at 1000 panels and 100 frames per eight hours. Panels vary in size, the largest being approximately 93 x 30 inches. The largest frame size is approximately 74 x 79¼ x 30-1/3 inches. Accordingly, two separate conveyorized finishing lines were set up: one, the panel line, and two, the frame line, separate except for a common cleaning and phosphatizing unit through which both conveyors feed.

The panel finishing line

Panels are loaded on the hook conveyor after the final press brake or welding operation, in a loading zone approximately 60 feet long. They enter the first station of the cleaning and phosphatizing machine, where



Left: Parts for front, back and sides of cabinets are formed in this area. Frame parts are cut and shaped as well as miscellaneous parts such as supports, brackets and gussets.



Center: Equipment for machining 18 compressor forgings per hour. 160 individual tools are used in machining of compressor case as it makes two trips around this automated tool —once in a horizontal position, once vertical.

Left: Parts for frames are positioned in welding jigs and held in positive position by air clamps which simultaneously apply pressure at all points for the arc welding operation.

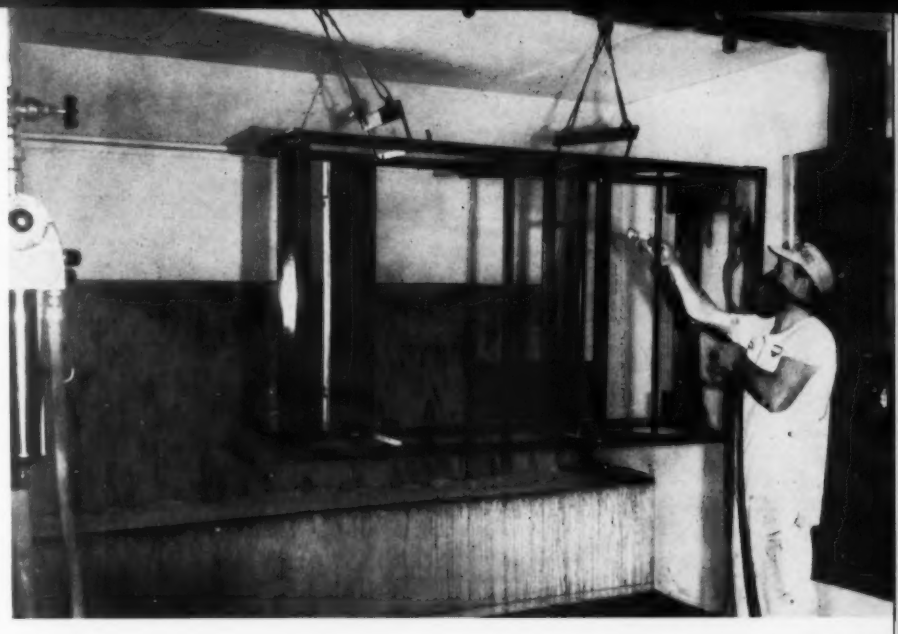
they are spray washed in an alkaline cleaner for 60 seconds, temperature 160-180°F. The second station is a 60-second hot water spray rinse. At the third station the panels are sprayed with phosphatizing solution for 60 seconds at 160°F. The fourth station is a 30-second cold water spray rinse, and the fifth station is a chromic acid rinse, sprayed at 160°F. for 30 seconds.

After the panels leave the unit, they enter the steam-heated dry-off oven, temperature 325°F. for five minutes. They then are air-cooled and proceed to the first of two paint booths, so arranged that one operator sprays the back or inside surface with primer, and the next sprays the front or outside with enamel.

After spraying, flash time of about five minutes is allowed, after which panels enter the bake oven. The conveyor makes three passes in the oven which gives two minutes heat up time and 18 minutes bake time at 308°F. After leaving the oven, finished panels cool on the conveyor and are removed for application of insulation.

The frame finishing line

The completed frames are moved on roller conveyor from the welding jigs to the loading area, where they are lifted and hooked to the overhead conveyor. They go through the same cleaning and phosphatizing process



Right: After fabrication and welding, frames move by conveyor through phosphatizing and finish enameling systems. Here operator applies a coat of lacquer with hot spray equipment.

as previously outlined, receiving the same phosphate coating as the panels. After leaving the dry-off oven, they enter an air cooling unit for three minutes to reduce the temperature before spraying. Then they enter the two paint booths so arranged that one operator sprays one side, and the next operator sprays the second side.

The frames then go through a forced air dry unit for about one and one-half minutes and then dry an additional 20 minutes on the conveyor before being unloaded at the first work station on the general assembly line.

This cleaning, phosphatizing and enameling system in operation is providing a highly uniform product, has the flexibility required and has shown a substantial reduction in cost over previous systems.

Machining small forgings and castings

Forgings and castings are fed into the machine area in containers holding the proper number of parts for economical feeding of the operations. The machines are grouped so that the parts flow from operation to operation with little or no handling between operations.

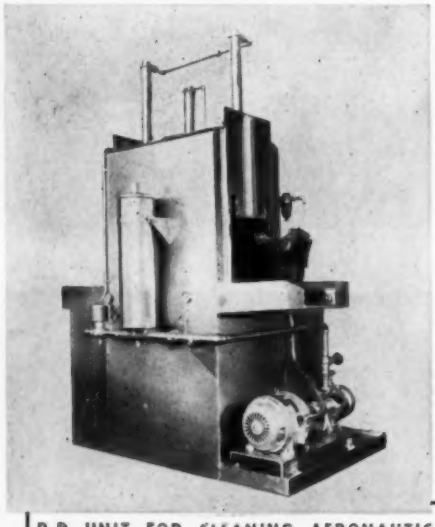
There are some new and unusual operations here. Take for instance, the crank shaft. Using shell molding, the casting size is held to within

Center: Pipe for condensers is cut to length and surface holes drilled. Here an operator welds pipe connectors at the proper hole openings.

Right: Brazing of average condenser's 36 joints is accomplished in about four minutes in induction brazing machine. The apparatus uses a frequency of 9600 cycles supplied by a water-cooled, self-contained, 50-kva, motor-generator set.

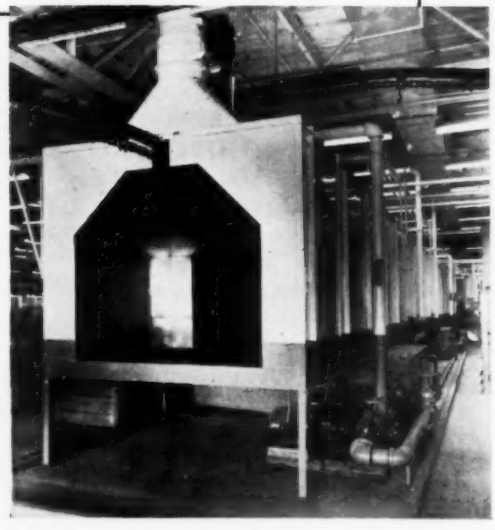
"CLEAN AS A WHISTLE"—

ELIMINATE CHANCE From Your Between-Operation Cleaning or Paint Preparation Needs . . . Whether Large or Small



P-D UNIT FOR CLEANING AERONAUTICAL CYLINDER HEADS

P-D AUTOMOBILE BODY BONDERITE SYSTEM
(photo shows "Entering End")



Peters-Dalton Power Spray Washers Are Designed and Built To the Job and For the Job

Modern metal finishing standards require washing equipment tailor-made for specific operations. This is essential to obtain the necessary product quality. It is too costly to take "chances" with the performance of these vital operations. All "chance" can be removed when you call upon Peters-Dalton engineers. They *can* and *will* specify the correct design and build the right type equipment to fulfill your own particular needs.

More than a quarter century stands behind P-D "know-how" for manufacturing equipment to handle your between-operation cleaning or paint preparation requirements. Peters-Dalton designers and engineers will lay out and produce the correct type of equipment to handle your job regardless of its size — whether a single unit or a complete installation. Depend on P-D to supply the services for meeting the production you have the right to expect. Just write, wire or phone.

Ask for our new Power Spray Washer Tech. Bulletin No. 301

Peters-Dalton INC.
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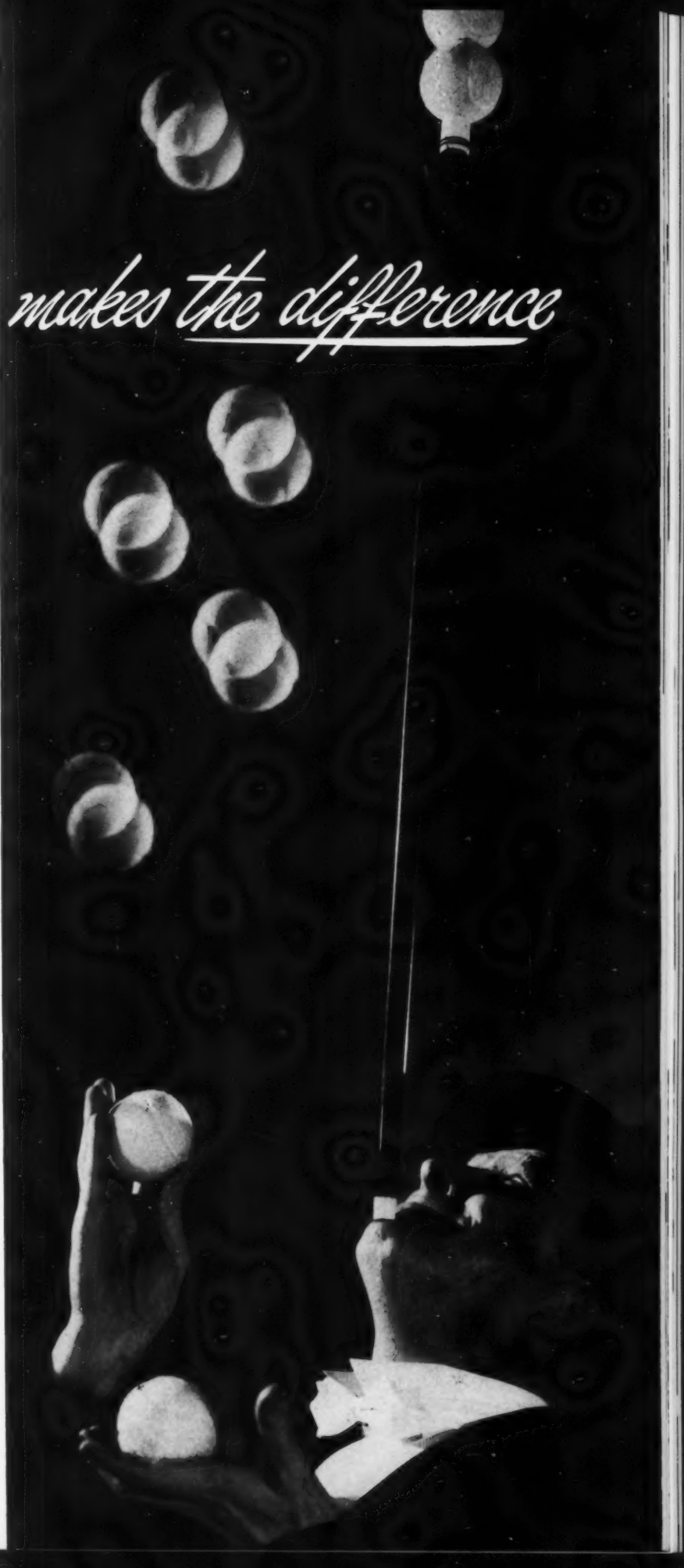
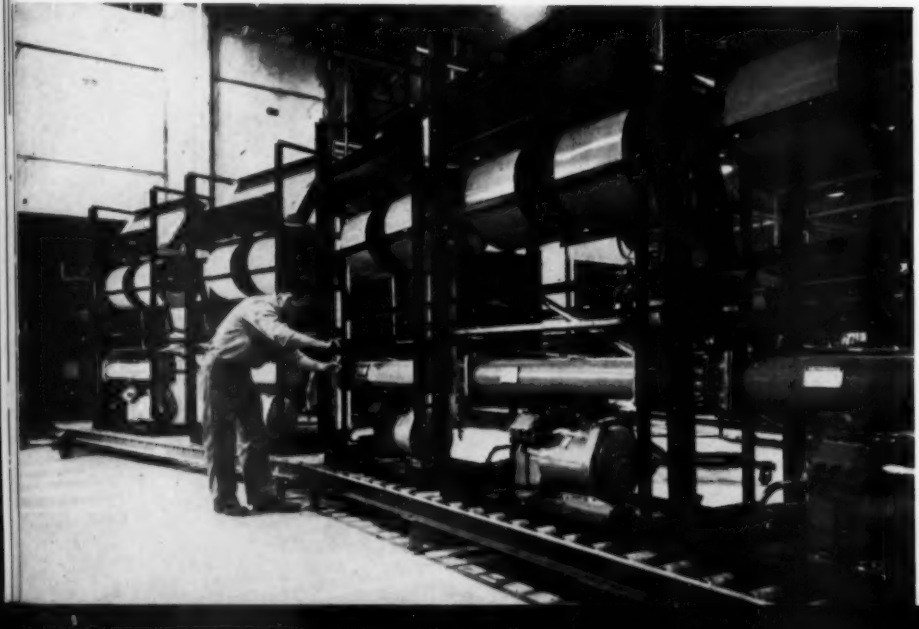


Left: After complete assembly, condensers are given an underwater leak test and then a coat of grey paint. They are then ready to join the main assembly line at the proper point in the cycle.

economical grinding limits. A centerless grinder finishes two different diameters and the bearing shoulder of the long end of the crankshaft in one operation. The throw end and shoulder are finished by use of a fixture in a standard cylindrical grinder. This operation is followed by multiple drilling, reaming and tapping of the throw end of the shaft for the counterweight. When an operator completes the shaft, he places it in the conveyor basket, which when full, is moved a matter of three feet and attached to the overhead conveyor. The overhead conveyor transports the parts to and through the degreasing operation and thence to the assembly area where they are unloaded and moved by roller conveyor to the point of assembly.

Where gas-tight fits are required, the parts are surface ground instead of doing the conventional turning of parts. By this method, the required micro-inch finish and close tolerances are obtained more easily than by turning. These operations are in most cases faster than the conventional turning operations because multiple parts can be surface ground simultaneously.

Connecting rods are bored, drilled, and reamed to tolerances of one-half of a thousandth in a special automatic time cycle machine. Thence, to a semi-automatic miller where a num-



Center: On general assembly lines, compressor is attached to the base, condenser and evaporator are mounted in position, fans are installed, and refrigerant tubing connections are made.

Left: After assembly of major components, the units are advanced into controlled cycle dehydration ovens prior to evacuation of tubing and charging of refrigerant.

Right: To facilitate the wiring of an air conditioner, the cables, switches, controls and relays are pre-assembled. The sub-assemblies and fan motors are then stacked on wheeled racks which carry them to the general assembly lines.

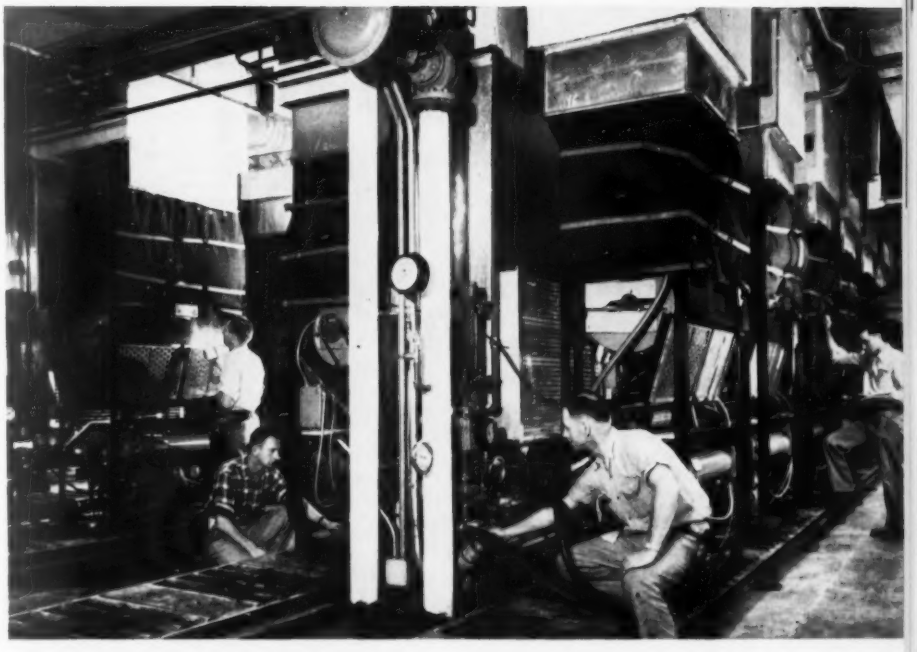
ber of rods are milled at one time, the bearings are pressed in, the oil holes drilled, and the bearings sized on a borematic machine.

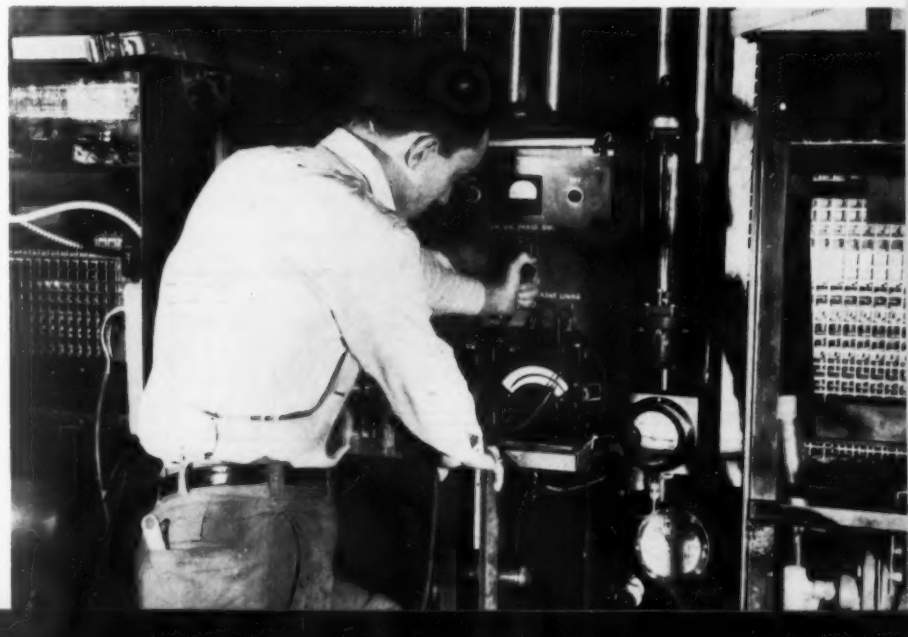
The complete machining of the bearing housing is performed with three handlings of the part and all operations are cycled to obtain the maximum productivity. The housing is turned, bored, back faced, and drilled to tolerances of one-thousandth in a semi-automatic turret lathe. While this operation is being performed, the operator presses in the bearings in a hydraulic press and places the housing in a precision boring machine where the bearings are machined to very close tolerances.

All machine parts required for the assembly of the compressor are placed on the overhead conveyor in the machining section and travel through a washing, cleaning, and degreasing operation and are unloaded at the assembly area, thus eliminating the problem of handling these parts from operation to operation.

Machining the compressor

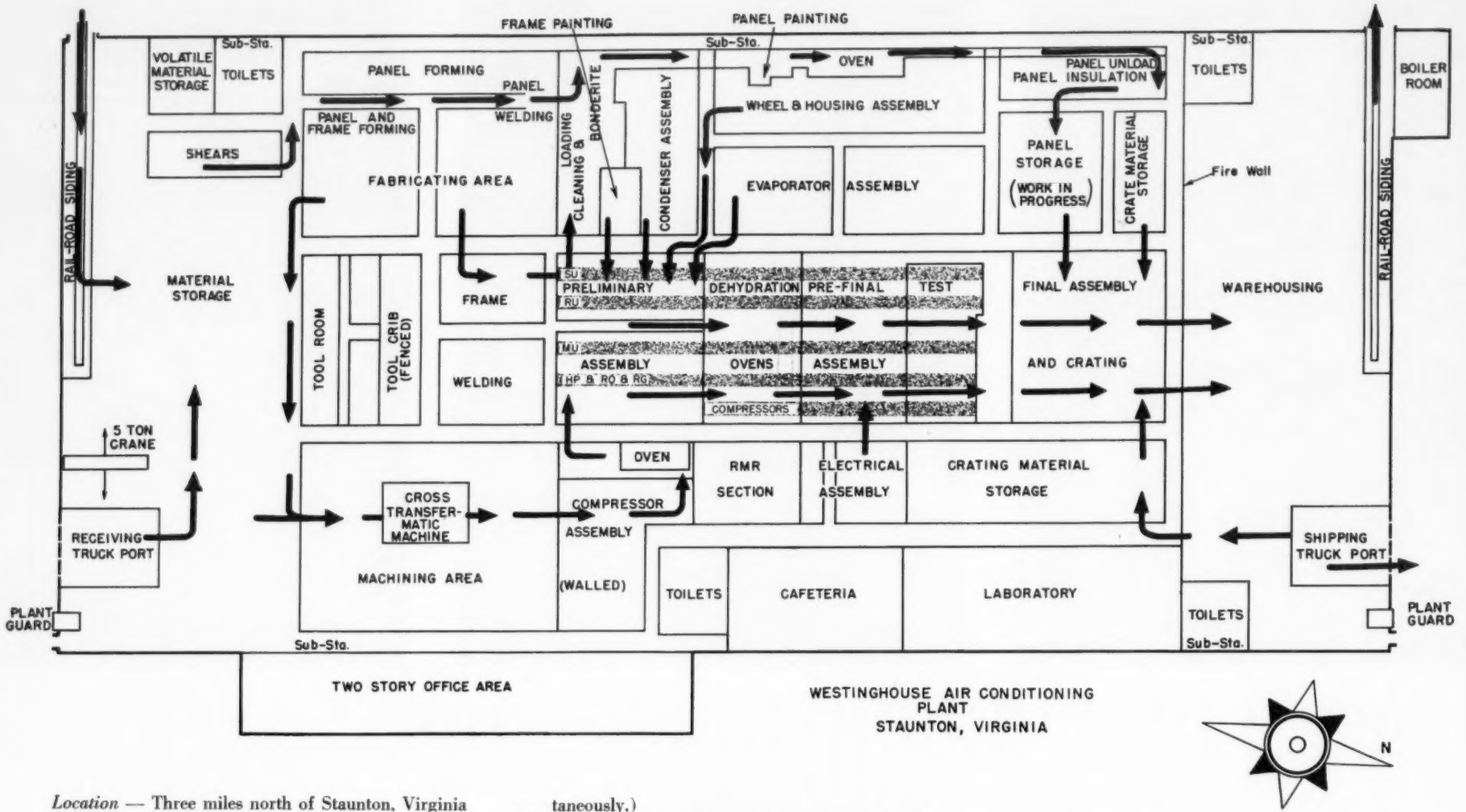
The major item of the compressor, the integral motor housing and compressor case, is completely machined in three handlings. Operations 1 and 2 are performed in a special automatic machine which is tooled to produce 18 pieces per hour at 100 per cent efficiency. The machine is





Center: After units are moved into position for capacity performance tests, they are connected to required electrical, water and air supply. All switches, controls and cutouts are checked for proper operation and the unit is run for one hour. Inlet and outlet air and water temperatures are checked with specifications.

Right: Technician adjusts controls of a unit undergoing final performance tests.



Location — Three miles north of Staunton, Virginia

Land owned — Approximately 200 acres

Size — Gross area of 301,080 square feet, including 276,120 square feet of manufacturing area and 24,960 square feet of offices. The manufacturing area includes the cafeteria as well as guard and service areas.

Overall dimensions: Plant 767′ x 360′ — Office 260′ x 48′ (2-story)

Shipping & receiving — Are provided for by interior railroad loading platforms and truck docks. (Four 50-foot cars may be unloaded simultaneously.)

Plant construction — Structural steel frame throughout — 40′ x 60′ column spacing is the basic bay size for the manufacturing area. Height from ground floor to bottom of roof steel generally is 18 feet.

Interior office partitions — Movable metal, 6′ high, and full height.

Special features — Various sections of the office building are air conditioned using a cross-section of Westinghouse equipment. Executive offices at each end of the second floor are cooled and heated with heat pumps.

Growth and expansion — The basic service utilities can be expanded 50 per cent. The plant itself is designed for 100 per cent expansion to the rear, keeping between the two railroad spurs from the Chesapeake and Western Railroad. The plant walls of precast concrete, steel sash and corrugated asbestos siding can be disassembled and reused in new wall construction. Office area can be expanded along the front of the building.

equipped with pallet-type, two position work holding fixtures. The rough casting is first loaded in a horizontal position in the fixture. Foundry spots insure the correct location of the rough casting. After loading in Station 1, the pallet is transferred to Station 2 where head A rough and finish bores the stator bores and rough and finish faces the inside bearing mounting face. Head A is a single spindle boring head equipped with a multiple blade carbide cutter.

Then follows a series of some nine automatic operation stations. In performing these operations, there are 160 individual tools applied to the machining of the compressor case.

The machine is equipped with an automatic chip conveyor, which delivers the chips into a hopper at the rear of the machine. Automatic lubrication is handled by three lubricators. Two of these provide air-oil mist for lubricating the heads. The third is a high pressure automatic unit for the ways of the various units.

The electrical control panel provides full interlocks for maximum safety and protection of the machine and the operator. Automatic operation is from the small push button station located at the loading station. The master push button station may be used for setup work or when changing over the machine.

Tool-meter pointers index counterclockwise with every machine cycle. When any one reaches "zero," the machine automatically stops. The red areas on the tool-meter dials are "danger zones" and represent the last period of useful tool life. When a tool-meter stops the machine, all tools in the "danger zone" are replaced — including the one on zero — thus minimizing downtime.

Assembly of compressor parts

The compressor assembly area has been arranged to flow the items from the unloading of the overhead conveyor to the subassembly positions and from the sub-assembly to the assembly with a minimum of handling and no hand fitting of any type. The bearing housing shaft and rotor assembly are balanced dynamically as an assembly to within 3 grams-inches. The assembly is not removed from the machine until complete balance is obtained by removal of weight from the rotor and counterweight. The drills for removing the weight are mounted on the machine and are calibrated so that the operator can remove a definite amount of material. This reduces to a minimum the trial and error method usually used on this equipment.

The crankcase is unloaded from the overhead conveyor onto a pallet on the roller conveyor that runs the entire length of the assembly area. This conveyor serves not only as a means of transporting the crankcase but also as the assembly table for the entire unit. A positive locating fixture is used to position the bearing housing, rotor, and shaft assembly in crankcase before driving home the holding fasteners, assuring perfect alignment. The hydraulic press for pressing the stator into the crankcase is made an integral part of the conveyor for ease of handling. A torque wrench is used on all fasteners to eliminate the possibility of overstrain and obtain positive pressures on all assemblies. At the end of the roller conveyor, the compressor is loaded on a 250-foot overhead conveyor timed to insure a six-hour period of the part in the dehydration oven. The oven is controlled to keep a constant temperature of 290°F. After the compressor is closed, it is leak tested with dry air at 300 lbs. per square inch pressure while submerged in a water tank. The units are then placed on a conveyor which carries them through the painting operation, and they are thence transported to the general assembly location.

Condenser manufacture

In the fabricating and assembly of condensers, the layout is arranged to provide straight-through flow with a minimum amount of material handling. The development of improved welding techniques has insured the uniformity of product and elimination of some previous time consuming operations. All holes in the condenser shell are drilled using air drills. The fixture holding the shells is so designed that any condenser shell can be drilled with one handling in one setup, the various size holes being drilled at the same time. The shell then moves to the tack welding station where the adapters, half couplings, etc., are tack welded and then finish welded to the shell. In the same area the tube supports and tube sheets are drilled and counterbored. After degreasing, the tube sheets are placed in a jig and preformed silver alloy rings are fluxed and inserted in the counterbore, and the assembly of the ribbed copper tubes is made. The assembly is tack brazed before removing from the fixture, and the condenser shell is then assembled and tack welded to the tube sheet, using Heliarc welding to eliminate slag and scale.

The assembly is then placed in an automatic specially designed welding machine. The assembly is rotated automatically at the proper speed and the weld made at the rate of about 35 inches per minute. The use of arc shielded welding wire reduces spatter and creates no flux inclusion, giving a clean, non-porous weld required on air conditioning apparatus.

The assembly is then placed on a specially designed dual-station high frequency, induction brazing machine. This equipment uses a frequency of 9600 cycles supplied by a water cooled self-contained 50 KVA motor-generator set with the necessary control equipment. The average condenser's 36 joints are thus brazed at the same time in approximately four minutes. Since there are dual stations, there is a capacity of a unit every two minutes of elapsed time.

After welding, the unit is given an underwater leak test at 300 lbs. per square inch pressure. After successfully passing this test, the heads are assembled; the condensers are given a coat of grey paint and are moved to the adjacent general assembly line at the proper point in the assembly cycle.

Evaporator manufacture

Evaporators, of the plate-type design using aluminum fins and copper tubing, are manufactured in a self-contained area on specialized equip-

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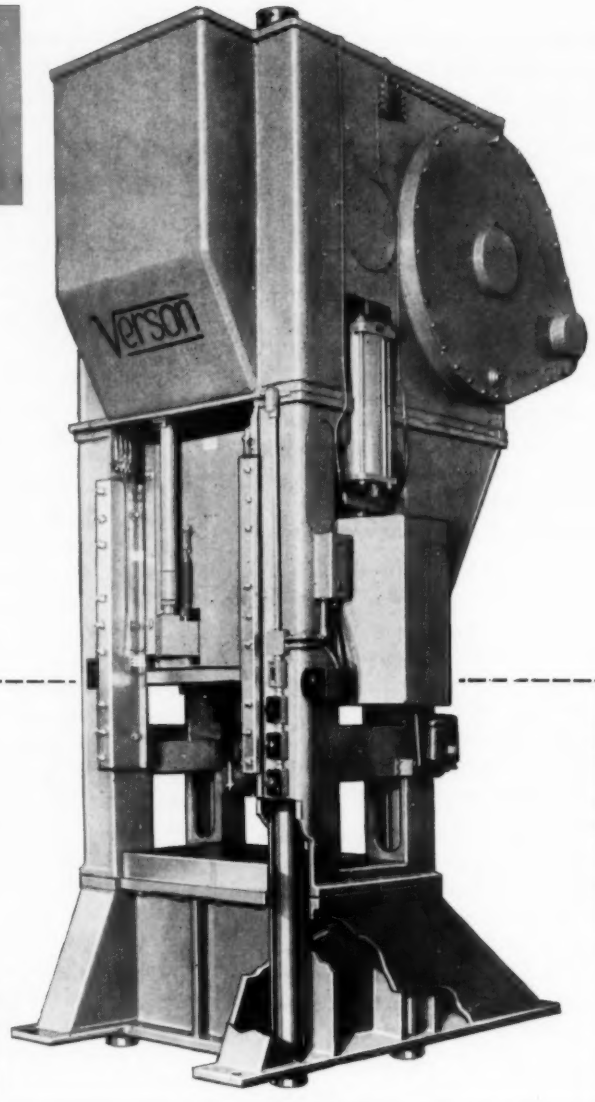
These are the features that make Verson presses your best buy



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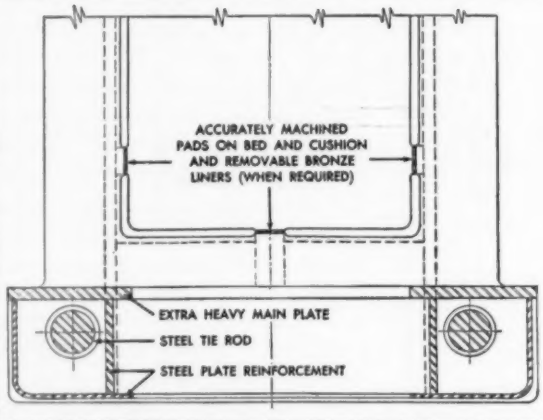
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Cold extrusion marches on

Part II—materials, lubrication, tooling, pressures and production information

by James M. Leake • PRESIDENT, THE LEAKE STAMPING COMPANY, MONROE, MICHIGAN; AND TECHNICAL CONSULTANT TO FINISH

LOW carbon steels are finding increasing acceptance as the material for cold extruded parts. They not only produce a product of superior physical qualities, but are the cheapest and most plentiful materials available. In fact, the severe work hardening of low carbon steel during cold extrusion imparts the physical characteristics of the higher priced, less plentiful alloy steels. Even cold extruded low carbon parts become so work hardened under the plastic deformation of its structure that they present a challenge to the best available die steels that must outwear them.

Increasing the carbon or the adoption of alloy steel introduces the need for more frequent anneals, greater attention to grain sizes and increased pressure requirements. A better understanding of the factors influencing these trends requires some discussion of the elements involved in such an analysis.

Steel under increasing pressure deforms uniformly within its elastic range until its yield point is reached. If the pressure is released before its yield point has been attained, the metal will return to its original shape. Low carbon steel has a low yield point while high carbon steel has a much higher yield point, making it less malleable, and offering a much narrower range of action.

When the pressure exerted on parts being extruded exceeds the yield point of the material, it enters the plastic range through which it advances until it reaches the ultimate strength of the material, a point beyond which the part will break. Metal pressed beyond its yield point will not return to its original shape. Low carbon steel has the widest plastic range between its yield point and its ultimate strength, and consequently possesses greater malleability. That is the reason higher carbon steels require more frequent anneals.

In some respects, material qualities favorable to deep drawing will be beneficial in the cold extrusion process. The steel should be non-ageing "killed" steel free of impurities. "Killed" steels and "rimmed" steels react differently in impact strength according to the extent of the reduction of the part during the process. The adoption of higher carbon steels as a material for cold extrusion may be limited by excessive tool wear and tool strength required.

With reference to the elements in steel used for cold extrusion, it is well to remember that any excess of silicon increases work hardening, and too much sulphur increases the possibility of the metal cracking. Also phosphorous contributes little to the cold extrusion process. Among the alloy steels, molybdenum, nickel, and chromium should be used in moderation, for they do not contribute to its malleability.

Lubrication

It may be of passing interest to know that molten glass is one of the lubricants now used in hot extrusion. For obvious reasons such a lubricant would be valueless in cold extrusion. However, the lubricants used are not entirely void of glamour in that they are unique applications of American ingenuity and more important still is the realization that without them there would be no cold extrusion.

It was only natural that the first lubricants tried in the extrusion of steel were those that had worked successfully in extruding non-ferrous metals. These proved inadequate to harness the sharply increased pressures involved in extruding steel. About twenty years ago a phosphate coating was developed that ushered in the new era of cold extrusion of steel, first in Germany and later in our own country.

Various types of phosphate coating have been developed that have different characteristics. Prominent among these is zinc phosphate coating. This process requires several equally important steps. The preparation of the surface of the part, the application of a crystalline metallic phosphate coat to the material and the ultimate supplementary lubrication with soaps, oils or fats, all of which are vital.

The parts must be thoroughly cleansed and rinsed; in some cases they must be pickled in acid to remove impurities and scale, and given a double rinse. This provides a surface necessary for the maximum adherence of the coating to the metal. The parts to be coated must be immersed for the proper length of time in the phosphate solution of the correct temperature and strength. The longer the treatment the greater the absorption of the coating, and the heavier coatings become necessary as the reductions increase. Finally the parts must be lubricated and very thoroughly dried before extrusion.

The design of the dies has a bearing on the length of time that this

coating will remain effective for the purpose for which it was intended. If the dies inherently restrict the plastic flow of the metal because of abrupt changes in direction and sharp edges, it may hasten the time when the parts will require recoating before further processing may proceed. Obviously, the parts must be re-coated after intermediate anneals.

Tooling

Well chosen die steels that have been properly hardened are as important to the most favorable results in cold extrusion as a well proportioned die design. They can only be intelligently chosen by carefully analyzing the functions that each steel has to perform. Another important consideration is the quantity of parts to be made and the tolerances that must be held.

In forward extrusion the punch pushes the part in advance of its own movement so that it has but little frictional contact with the flowing metal and has a life expectancy about double that of the die ring that has both multiplied and accelerated frictional flow through its orifice.

In backward extrusion, the punch usually has to withstand the friction engendered during the cold extrusion, as well as the sudden reversal of direction and finally the friction of the stripping action. Therefore, the punch has only about half of the life expectancy that the die ring may provide in operations of this nature.

Another factor to consider in choosing the die steels is the number of parts to be extruded and the tolerances to be maintained. Some use plain high carbon tool steels for the lower quantity, less exacting jobs. Others prefer high carbon, high chrome steels or high speed steels. Many people will agree that for high volume, close tolerance jobs that carbide punches or rings are highly important.

Once the steels have been chosen and machined the punches and die rings should be hardened and tempered at about 56 to 60 Rockwell "C", and if the steel wears too fast or galls, it is well to increase the surface hardness by nitriding. After heat treating, the working surfaces of the steels should be given a mirror polish and so much the better if this polishing can be processed in the direction of the material flow. Occasional repolishing and stress relieving of the die steels prolongs their useful lives by correcting strains that might cause them to prematurely succumb to surface fatigues.

The punch and die holders must be sufficiently rigid to prevent any flexing of the die steels to insure them against breakage. Self alignment should be built into the die so that accurate guidance of the punch does not depend on the accuracy of the press. This is very vital in taking advantage of the close tolerances that are possible in cold extruded parts.

Pressures

Any pre-determination of the pressures required for cold extrusion must consider many factors, some of which are variable. The yield points of the material before extrusion and in its work-hardened state after extrusion must be known. The more variable factors are hidden in the conditions leading to increased friction that retards the plastic flow of the metal.

The most favorable conditions requiring a minimum of pressure prevail when properly lubricated parts of a known yield point are processed in an open die having highly polished extremely hard surfaces with generous radii, over which the metal must flow, at slow speed, unrestricted by abrupt changes in direction. As the heat generated by extrusion increases, the pressure requirements decrease.

Greater restriction to the movement of the metal and an excessive amount of metal in a closed die can sharply increase the pressure requirements. In an open die under the most favorable conditions, the pressure used will approximate the yield point of the work hardened steel of the extruded part.

In forward extrusion the included angle leading to the orifice through which the part must flow is a major influence on the pressure required and the resultant hardness. Metal forced through a nozzle with a 180° included approach angle may require almost 50% more pressure than if the included angle was about 45°. It must also be remembered that the punch must transmit all of the pressure in forward extrusions without wavering.

Extremely large reductions at higher than ordinary speeds may require only 60% of the pressure required at slow speed. On the other hand, in the case of low reductions the higher the speed the greater is the required pressure. Another factor in the pressure required is the amount of carbon, which after all, is translated more accurately as a difference in yield strength in computed pressures. 50 point carbon steel in its normalized condition has a yield strength about double that of ten point carbon steel, so it requires about twice the amount of pressure.

Production

Cold extrusion requires sturdy presses. Greater pressure is required to start the flow of metal than to keep it in motion. But the maximum stress comes at the end of the stroke, especially if there is a surplus of metal in a closed die. Some prefer hydraulic presses above 1000 ton capacity because of the longer sustained peak load requirements. On the other hand, a faster mechanical press action may require much less tonnage and increase the output.

Presses that develop several thousand ton pressures are now available for cold extruding civilian parts. They can easily process parts up to 50 pounds each. Three or four operations may be performed in one press on 10 pound parts. Cylinders having 5" to 6" inside diameter may be extruded to a depth of 3 to 4 feet. The walls of these parts may be imparted a 40 to 50 micro-inch surface finish.

In cases of absolute necessity the walls of a deep cylinder may be maintained within a .002" to .004" variation in thickness. Of course, this means a shorter working life to the working steels between die rebuilding times. The frontal area of the punch must absorb all of the pressure used in cold extrusion and may range

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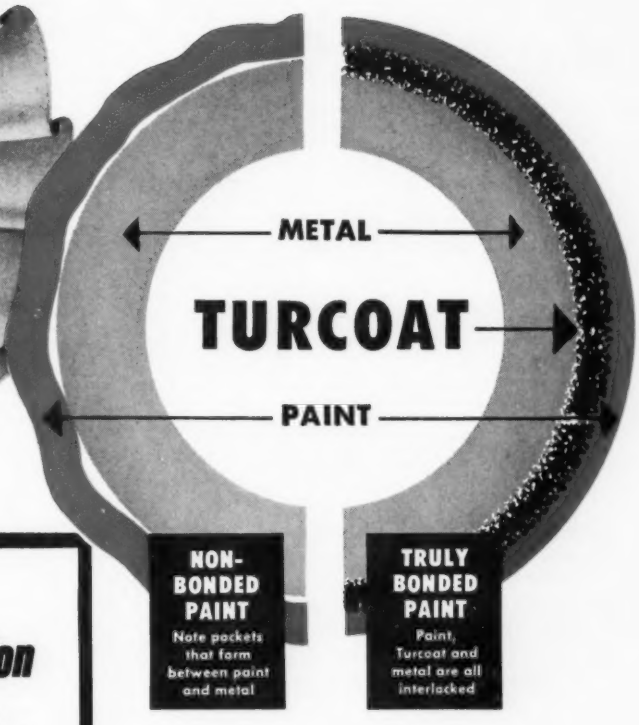

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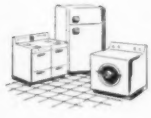

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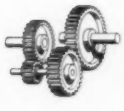

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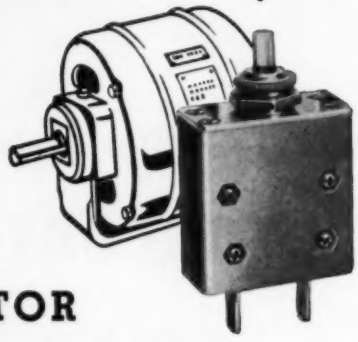

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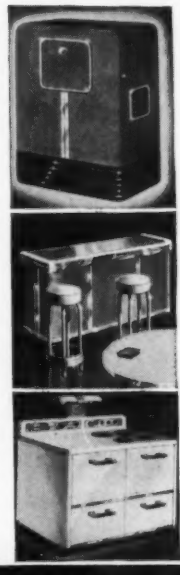

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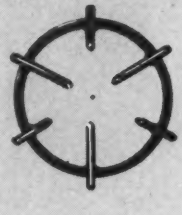

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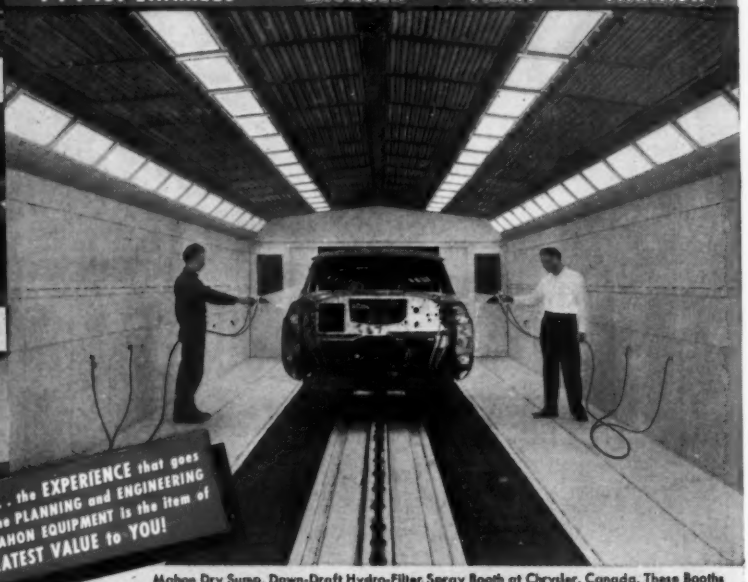

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The golden egg

background information, some practical suggestions and a note of warning by one who has been concerned with the development of glass lined water heater tanks since 1939

by Lee R. Erwin • *CHIEF PROJECT ENGINEER, DAY & NIGHT DIVISION, CARRIER CORPORATION, MONROVIA, CALIFORNIA*

BEFORE going into details on the subject of enameling practices for glass-lined water heaters, I would like to give a little past history regarding the Day & Night research and development program that led to our production of glass-lined water heaters.

The history of our development program dates back to the fall of 1939 and the spring of 1940. It was during this period that we produced a number of glass-lined water heaters for field testing.

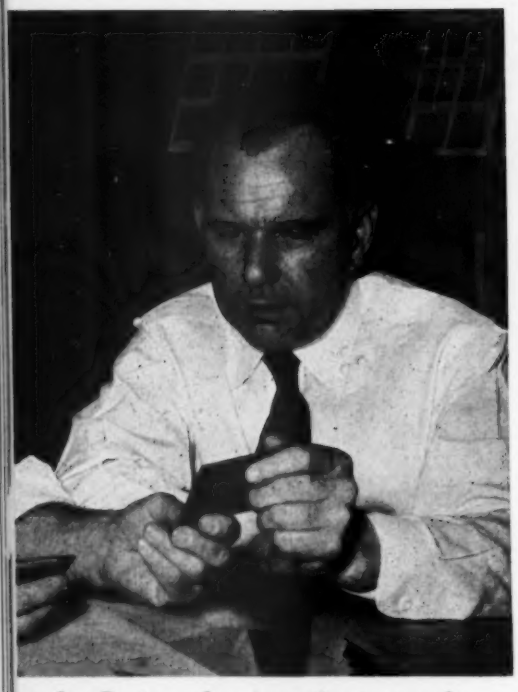
Fortunately for my department, Day & Night management has always recognized the value of field testing, thereby avoiding a great number of troubles that could result if no field testing were done.

Like everyone else in the manufacturing business, research and development on peace time products was rapidly changed over to the war effort at the start of World War II.

During this war period, the glass-lined water heaters that were produced prior to the war had already been installed in various homes throughout the country. Areas had been selected that were known both as bad and good areas for galvanized water heaters.

Early field testing showed special coatings necessary

After the end of World War II, data was collected on the results of the field testing program. The findings were not very encouraging. However, one fact did come out of this program that was of great value —



Lee Erwin, author, inspecting test panels coated with special water heater enamels.

it was that the glass used to coat the test tanks was quite soluble in hot water. In some cases, most of the glass coating had disappeared.

It was quite apparent at this time that, if glass-lined water heaters were to be manufactured as a quality product, better glasses had to be produced first.

A great deal of time and money was expended by my company to set up means and methods to determine — "what is a better glass?" Many ideas and tests were tried out to correlate, if possible, the relation between the glass weight loss during accelerated testing to the weight loss that would occur in actual service.

Of all the test methods tried out, and there were many, the one test that we developed and which could be duplicated with a fair degree of accuracy is the reflux test. This test is used, I believe, by most of the people connected with glass-lined water heater production.

Reflux "weight loss" test used for rating glasses

This method of test is common knowledge, but a brief description of the test is given:

Suitable test plates are prepared of a size to fit the test apparatus. Plates are then coated on one side with the required enamel thickness. The opposite side is then fog-coated to eliminate any loss of scale during the testing period. After the coating has been fired, the plate is allowed to cool to room temperature. The sample plate is then very carefully weighed, to the fourth decimal point. In our case, we run four sample plates of each glass tested.

After the weights have been recorded, the sample plates are assembled in the reflux test equipment. Two or three bare plates are placed under the test plates so that localized spot heating from the burner flame will not occur. In our case, we use 100 cc. of test solution for each reflux station. The time is started when the test solution comes to a boil. Normal time cycle for long term tests is 20 hours; then the test set-up is broken down, and the test plates washed in distilled water. Plates are dried and allowed to come to room temperature, then weighed and the weights recorded.

After weighing, the samples are again assembled in their reflux station and the cycle repeated until 260 hours of test time has been accumulated. With this method of testing, weight loss points can be graphed for every 20 hours. This allows the research engineer to determine if the glass being tested is good enough to warrant more test time.

While I do not believe that the reflux method of testing is the final answer, it certainly points the way to determine the average solubility of a glass.

Zeolite-softened water affects glass dissolution rate

It was with this method of test we discovered that Zeolite-softened water could dissolve glass at a much faster rate than any other waters.

After establishing a test method, the next step was to find a correlation factor between the reflux tests and actual service conditions in the field.

To obtain this correlation factor, it was necessary to place more and more glass-lined tanks in the field, coated with various glasses. Many of these tanks were brought back to our laboratory for inspection, some of them with only six months service.

Many of these test tanks are still in service and a few are recalled each month for inspection. When you stop to think of all the various water conditions that exist in the United States, you can realize the scope of such a field testing program. It is not only expensive, but also time-consuming. The value of such a program is important, because, by this means, correlation factors can be established over a long period of time.

Application problems to consider

After having found a glass that appears to have all of the qualities that you have been searching for, many other problems come to light; such as, can the glass be worked in the enamel plant, does it have good bond, will it fire out in the type furnace that you had planned to use? *(There are many, many other problems to consider.)*

I am sorry to say that a number of water heater manufacturers to this date believe that, to get into the glass-lined tank business, all that is necessary would be to leave the zinc off of their standard galvanized tank, pour glass into one of the head couplings, run it through some kind of a furnace; thereby producing a perfect tank.

This type of wishful thinking can be dangerous — not only to the manufacturer, but to the enameling industry as a whole.

As a case in point, I recall an event of two or three years ago, when plastic linings were the "only answer" for a permanent coating for gas-fired water heaters. Due to over-confidence, and especially through the lack of field testing of plastic linings, a few manufacturers went the plastic route. The plastic route, in this case, proved disastrous to the companies involved. Replacement of tanks that failed in the field cost thousands of dollars. Not only had the tank failed, but the word "plastic" became a fighting word to the dealers, the jobbers and the plumbers.

I am citing this case to bring home to the enameling industry that this same condition can happen again. In this case, the fighting words would be "porcelain enamel".

What would be your reaction *(as a manufacturer)* if you were asked, "Can you produce a glass-lined tank that will have a total area of exposed metal not exceeding three square inches?" The allowance of the three square inches was made because the magnesium anode would take care of the exposed metal.

Magnesium anodes — and a warning

Too many people take for granted that a magnesium anode in a glass-lined tank takes care of everything. This is far from the truth. Few people realize that a great number of anodes are removed from glass-lined tanks after they have been installed in the home. This is due to various reasons. Probably the most common would be in sulphur-bearing waters. The reaction between magnesium and sulphur generates hydrogen sulfide gas, thereby producing a "rotten egg" odor and taste. It is only natural that the home owner complains about the odor and taste, especially if he did not experience this difficulty with the galvanized heater he had just removed.

If the anode is removed from the tank in question, how safe would you feel even with a near perfect tank, let alone the tank you had purposely produced with the three square inches of bare metal? I think I can answer this for you — you would not feel very safe, and rightly so. It is for this reason I feel that the responsibility of producing the best quality job rests squarely on the shoulders of everyone concerned.

Divided responsibility for acceptable quality

This responsibility starts with management — to provide the money necessary for research, design, and tooling to produce the proper design.

The responsibility rests on the frit suppliers to provide better glasses, to offer counsel and advice to new companies that plan expanding their operations to glass-lining; also making them aware of their responsibilities in turn.

The enameling plants must carry their share of responsibilities by producing and releasing only top quality ware.

The spelling out of the responsibilities probably would not be necessary if the enameling industry and the manufacturing companies as a whole could set up a workable set of standards as a guide for the manufacture of glass-lined tanks.

Standards needed

I am aware that the Bureau of Standards and the Porcelain Enamel Institute started such a program approximately two years ago. From the last reports that I have had, which are not too recent, this program has apparently bogged down due to differences of opinion as to the methods of testing for various glasses.

Speaking as a manufacturer and taking into consideration the magnitude and the dollar volume involved in the future of the glass-lined water heater program, it would appear that something should be done immediately to iron out the differences of opinion and get this show on the road.

It has been very disappointing to the Federal and State agencies, also to everyone else connected with this program, that as of this date no one can call out a specification standard for a glass-lined water heater.

For the lack of a glass-lined water heater specification standard, many sales are lost. Many people feel that

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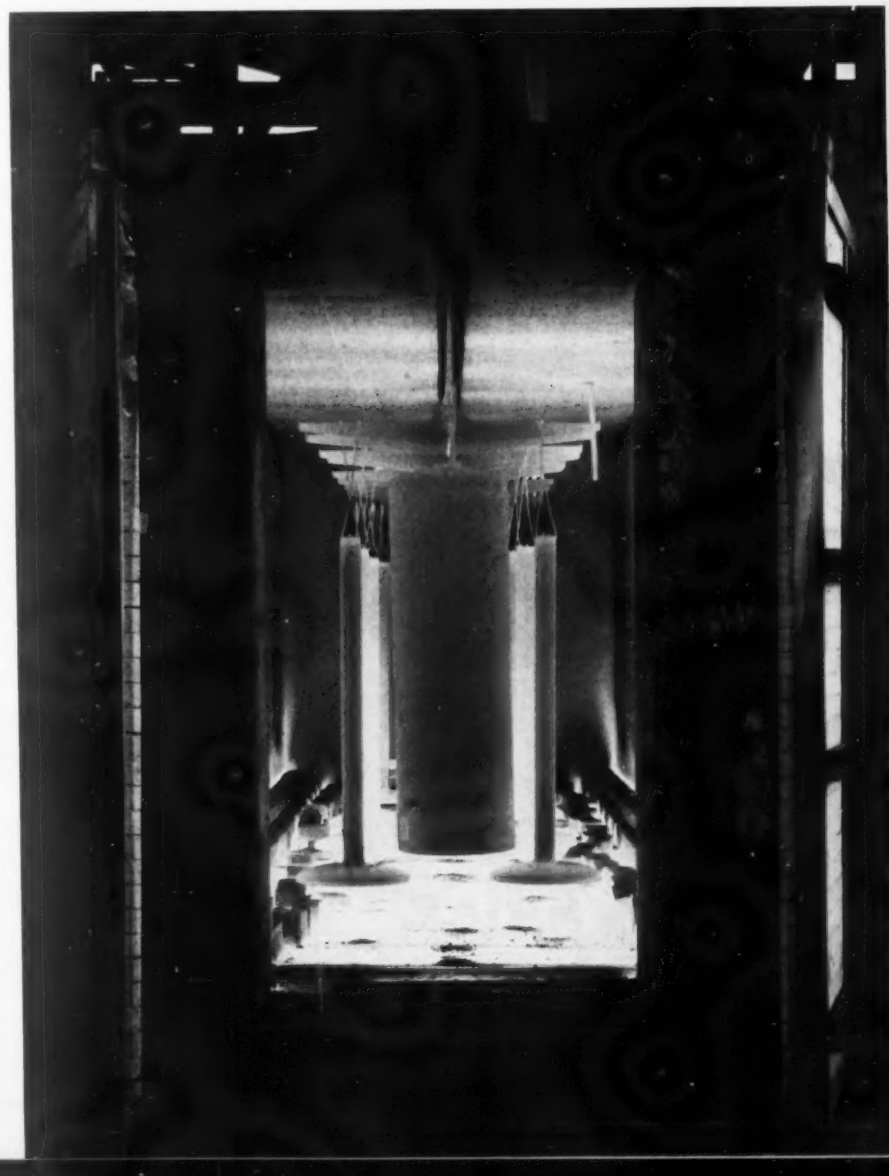
Water heater tanks and flues being fired in furnace at Day & Night plant.



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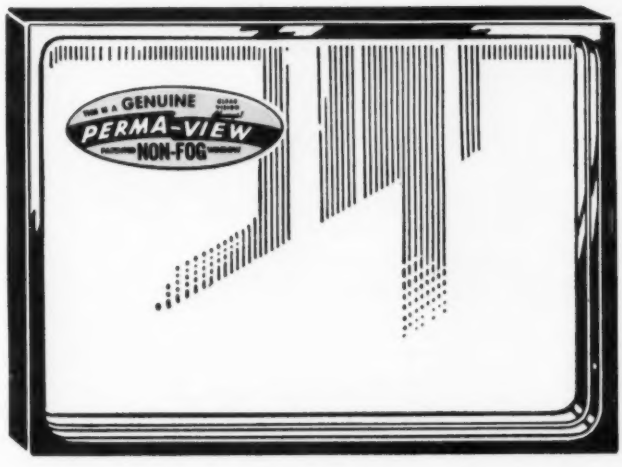

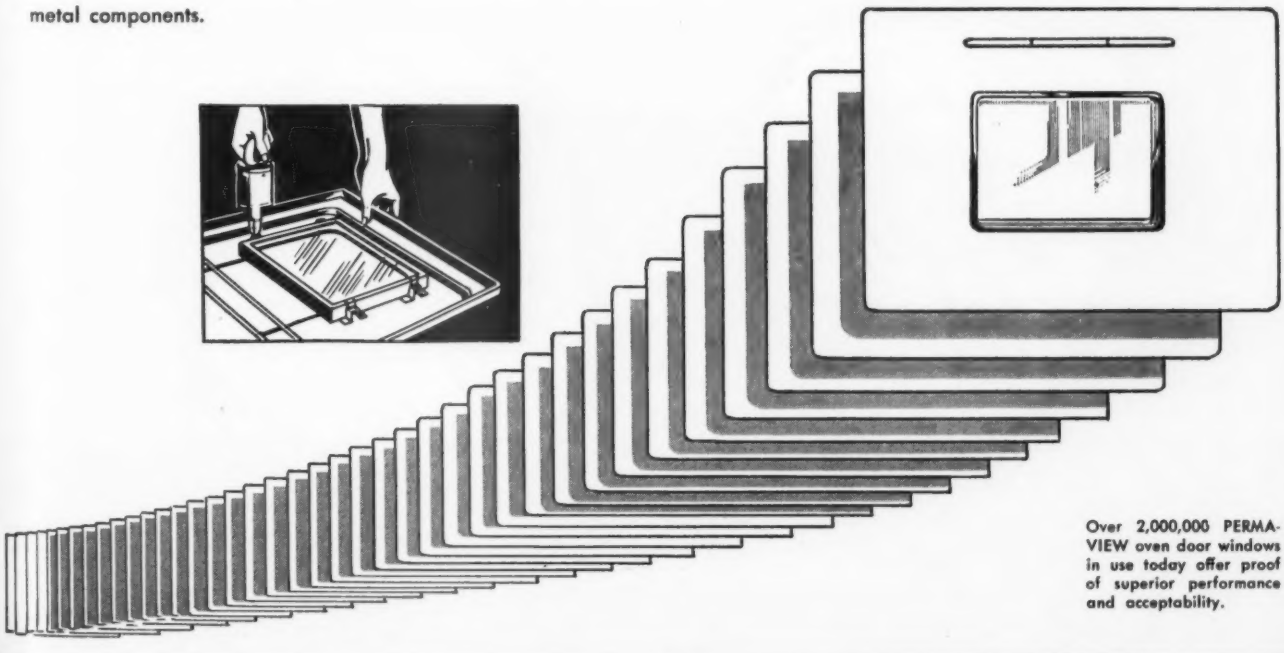

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Porcelain Enamel Institute holds mid-year divisional conferences

illustrated with finishfotos

THE Porcelain Enamel Institute's Architectural, General Enameling and Sign Divisions held their annual mid-year conferences at the Edgewater Beach Hotel, Chicago, May 9-11.

The Sign Division met May 9, with Hugh McE. Patton, of Ingram-Richardson Mfg. Co., and division chairman, presiding. The division discussed various market development projects, direct mail, advertising and exhibits. Other discussions covered an industry wage survey, sign statistics, color stability and comparison studies with other sign materials.

Metal clad buildings —a giant needing awakening

On May 10, the Architectural Division's morning session was devoted to 10-minute reports on progress and proposed actions by chairman of key division sub-committees. The afternoon session was given over to panel discussions on core materials for curtain walls. (L. A. Barron, a speaker at the afternoon session, described the metal-clad building market as "a giant needing awakening.")

After Glenn A. Hutt, of Ferro Corporation, and PEI president, presented introductory remarks, J. W. Vicary, of Ervite Corp., and division chairman, discussed the growth of porcelain enamel in architecture. Vicary also presided at the morning session.

Sub-committee reports were presented by the following: Milton Male, of U.S. Steel Corp., on "building codes"; H. R. Spencer, Jr., of Erie Enameling Co., on a "weathering correlation test program"; B. B. Loring, of Seaporcel Metals, Inc., on "standards and specifications for veneers"; J. G. Terry, of Armco Steel Corp., on "curtain wall specifications"; E. F. McDonald, of Ingram-Richardson Mfg. Co., on "adhesives"; A. C. Weierich, of Davidson Enamel Products, Inc., on "joining materials"; G. H. Eggleston, of Kaiser Products, Inc., on "core materials"; John Winget, of Armco Steel Corp., on "long-range planning"; and Mr. Vicary on "estimating and proposal forms and other projects."

Core materials for curtain walls

The afternoon session on May 10, devoted to "core materials for curtain walls", was presided over by G. H. Eggleston, of Kaiser Metal Products, Inc., and chairman of the architectural division's sub-committee on core materials.

R. S. Funk, of the Perlite Institute, opened with a discussion on "perlite" which was described as a crude form of lava which is crushed and quickly heated to 1500° F. at which temperature "it expands like popcorn." He said that it can be cast in any position, and has its best application in a honey-comb core. It is inorganic and incombustible.

Walter Lovett, of Pittsburgh Corning Corp., described properties of foam glass which is made by heating finely-ground glass to about 2000° F., annealed in a lehr, and then cut to sizes and shapes as required. One of its characteristics is that it will not shrink or swell.

R. L. Hildebran, of U.S. Plywood Corp., described a honeycomb made from 100% unbleached kraft paper impregnated with thermosetting resins. One of its principal features is that expansion due to heat is not a problem because it keeps pace with

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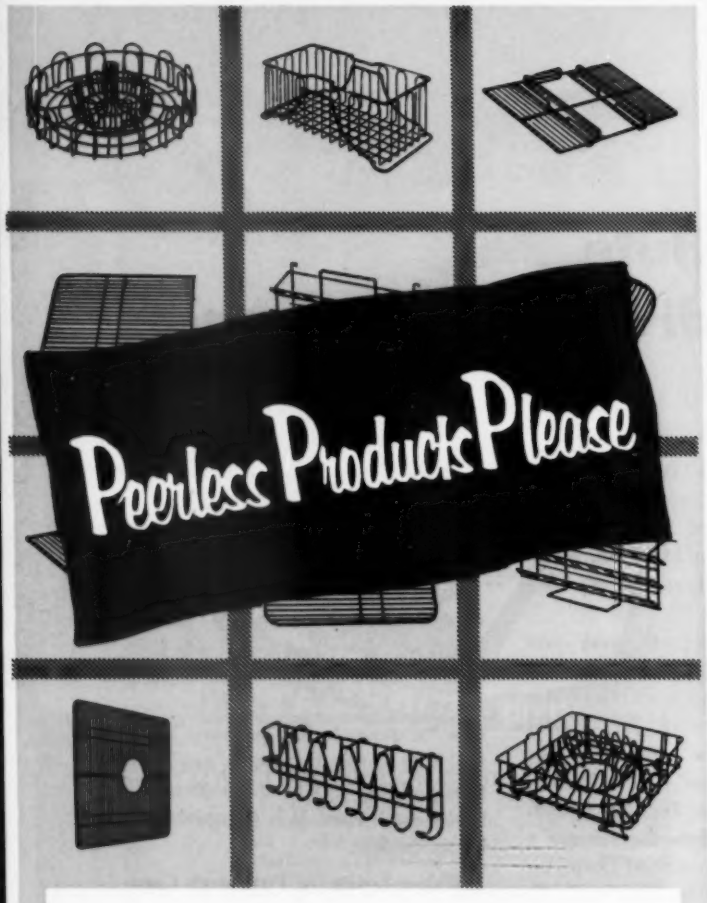
Panel on core materials, left to right: Walter Lovett, Pittsburgh Corning; L. A. Barron, Vermiculite; R. S. Funk, Perlite; G. H. Eggleston, Kaiser Metal Products; R. L. Hildebran, U.S. Plywood; M. G. Jensen, Fiberglas; Wm. Marshall, Insulation Board

Panel on general enameling, left to right: J. R. Leary, Alcoa; D. E. Sorensen, Ernst & Ernst; J. R. McCord, Ferro; W. H. Lowry, Vitreous Steel; C. P. Lohman, Pemco; N. W. Neice, California Metal Enameling; and R. F. Hafer, Reynolds Metals.



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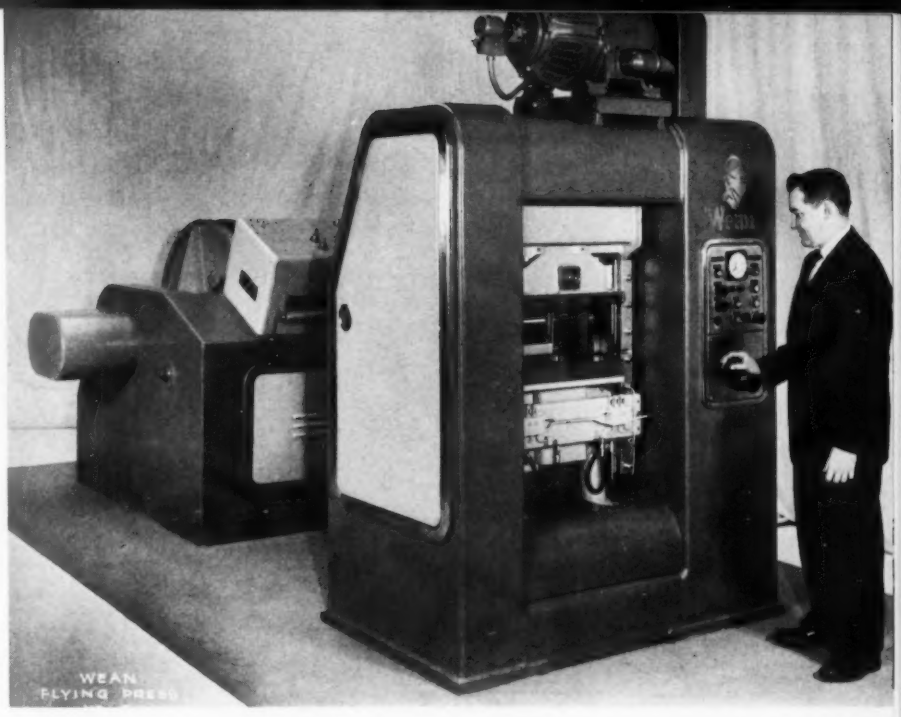
THE editors of *finish* had an opportunity to inspect a new stamping setup which could well make many changes in high speed production lines of the future.

The innovation is the "Flying Press" as engineered by Wean Equipment Company, of Cleveland, Ohio.

The setup, as viewed by *finish* editors, including an uncoiler followed by leveler rolls and a free hanging loop which immediately precedes the new type press.

The conventional uncoiler feeds through the leveler to remove coil set and then into the free hanging loop. This is conventional to this point as a coil feed installation except that the feed of the press is at a constant speed.



New "flying press" for high speed stamping work

The whole mass of the press, including dies, moves forward while engaging the material and back when disengaging. Top and bottom dies are both conventional.

There is no intermittent feed on this press. The builders believe that this will eliminate inaccuracies in feed lengths due to roll slippage.

The press has been dynamically balanced. It was demonstrated that a coin can be placed on edge on the top of the housing and then the press operated at speeds as high as 300 strokes ("revolutions") per minute without causing the coin to fall.

Another point of interest is that it is not a high speed press with short feed length, but a high speed press with unlimited feed length. For instance, holes could be pierced every 3 inches or every 100 feet.

The press inspected is rated at 60 tons and has a bed plate 12″ x 20″ with JIC knock-out openings, bed plates and bolsters. Wean reports that presses are under construction for sizes suitable for range tops, dryer tops and other large appliance parts. It is pointed out that in the stamping operation dies come together as in a conventional press as far as pass height is concerned. Top and bottom dies are always parallel and horizontal.

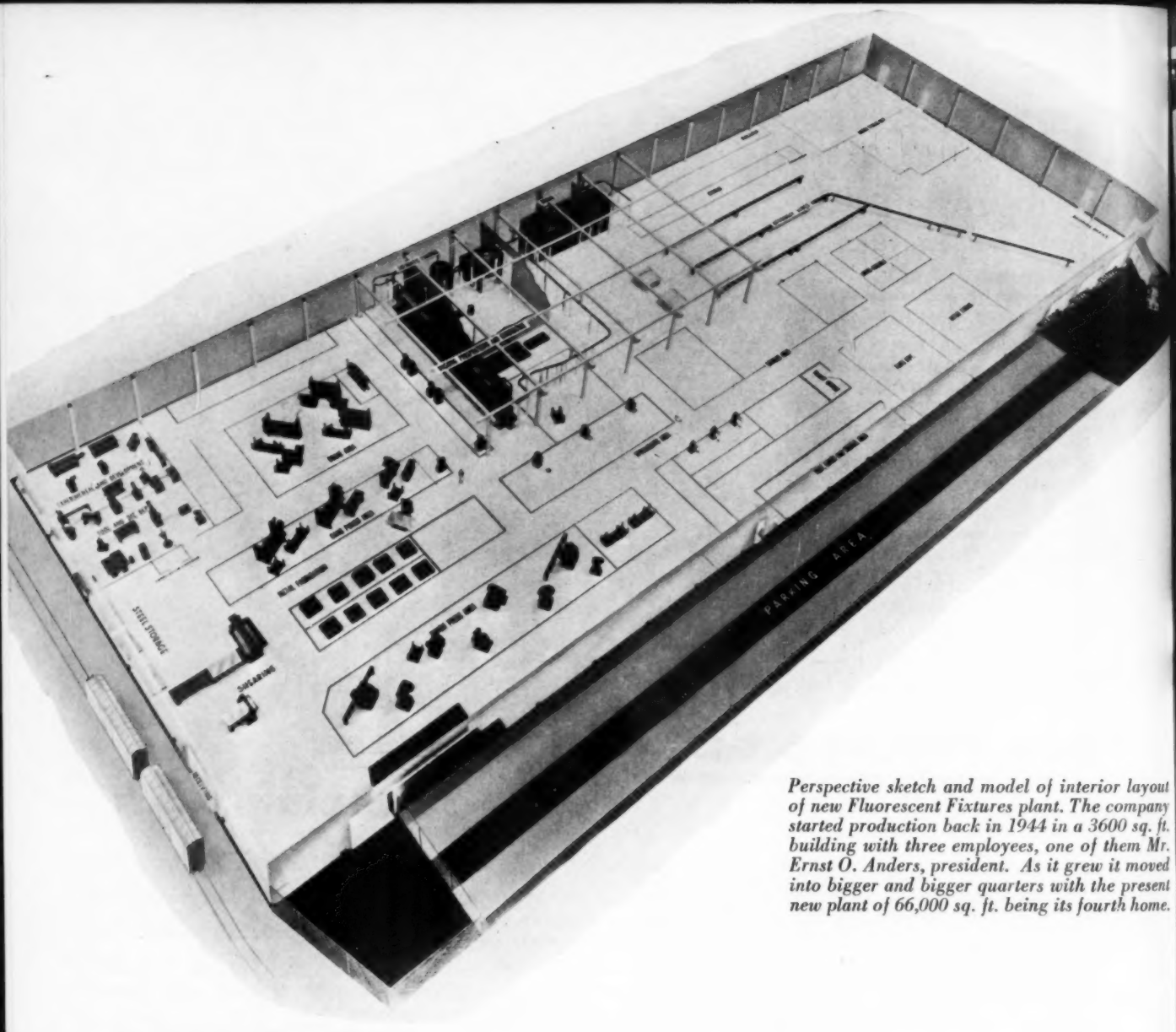
The press is especially adaptable for high speed operations and runs up to five times the speed of conventional presses that have been made. The continuous feeds aid in connection with long feed lengths and high speed.

We watched a demonstration on a small automotive hinge plate which normally runs in conventional equipment from 60 to 90 strokes per minute. In the "Flying Press" it ran as high as 410 pieces per minute, and the press is presently geared to go as high as 600 pieces per minute.

For additional information write to *finish* or to Wean Equipment Company, 22828 Lakeland Boulevard, Cleveland 17, Ohio.

Above: Photo of new "flying press" with conventional uncoiler and leveler rolls in the background.

Below: Note coin on edge atop control section of "flying press" while press operates at 300 strokes per minute.



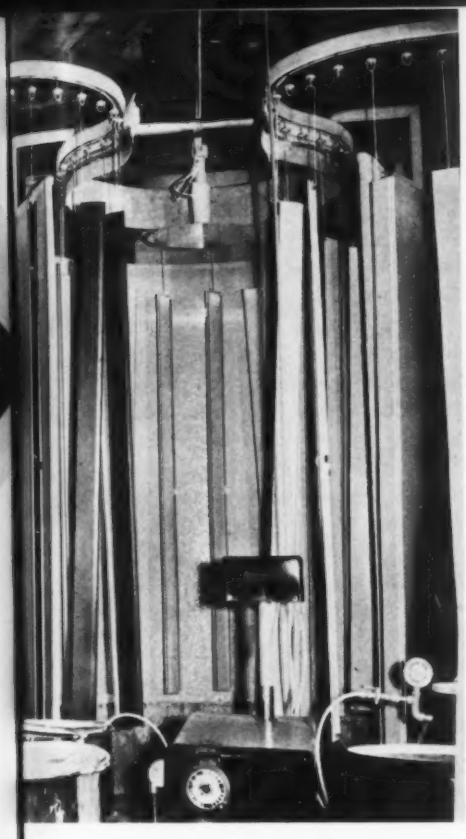
Perspective sketch and model of interior layout of new Fluorescent Fixtures plant. The company started production back in 1944 in a 3600 sq. ft. building with three employees, one of them Mr. Ernst O. Anders, president. As it grew it moved into bigger and bigger quarters with the present new plant of 66,000 sq. ft. being its fourth home.

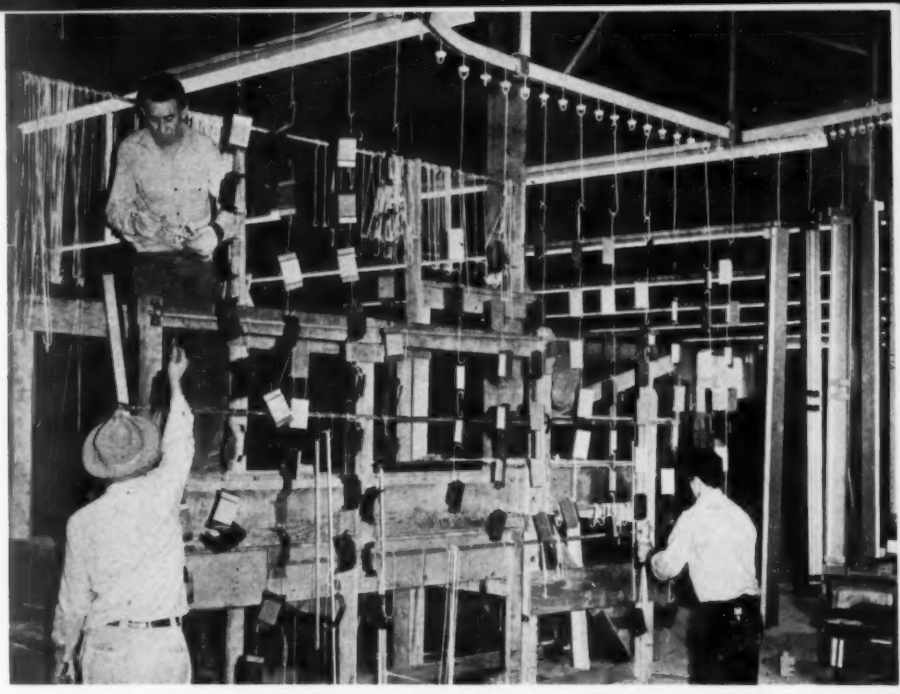
New plant "from the ground up" for All-Brite lighting fixtures

by R. H. Shaffer • WORKS MANAGER, FLUORESCENT FIXTURES OF CALIFORNIA, SOUTH SAN FRANCISCO, CALIFORNIA

AFTER we had outgrown our older quarters for the third time in eleven years, our company decided to "design and build the most modern fluorescent fixture plant in the industry." This time we were to be able to start from scratch, unhampered by existing building or equipment. This, as far as we knew, was to be the first time a Western fluorescent fixture company of our size was to occupy a plant designed from the very ground up for this type of production.

The manufacture of All-Brite fluorescent fixtures is divided into three principal operations: metal fabrication, cleaning and finishing, and final assembly. Of the three, finishing is in many ways the most critical, as it has everything to do with the appearance





Above: Loading zone for conveyor which carries a wide variety of parts toward washer to right, and then into electrostatic spray zone for application of synthetic enamel.

Left: From cool-down zone following cleaning and phosphatizing, conveyor carries parts into electrostatic zone, looping around reciprocating, disc-type atomizer.

of the product. In addition, the baked white enamel reflecting surfaces must have a very high reflectivity with a minimum of variation and great durability. It was important, therefore, that we concentrate our efforts to obtain the best possible method to produce the desired results in mass production — but with complete quality control.

We knew that proper metal preparation was important so we selected a conveyorized multiple stage washer for the phosphatizing stage. This was designed to handle parts up to 10 feet long when hung vertically. A capacity of 15 tons of sheet metal per shift was provided.

The method of applying our heavy, glossy coat of baked enamel was our next concern. We had pioneered in our area the method of hanging fixture parts vertically from an overhead conveyor and wished to continue to use this method. While many of our parts are eight feet, and more, long, others are just an inch or so square. We wanted to hang these all on one line and to intermingle them occasionally as required. This introduced an almost insurmountable obstacle to any known method of automatic spraying, and we had reluctantly concluded to continue our hand spray system when the reciprocating disc atomizer for electrostatic spraying came upon the market. The layout of the finishing department was then tailored to the installation of this new type of electrostatic spray finishing equipment.

In the middle of January, 1955, we began our first testing of the finishing equipment which had been nearly all installed by then. On January 23, we began running production through our finishing line, and that same week we shut down our old plant's hand spray line. Metal working equipment had been transferred over from the old plant to the new one, some 10 miles away, without more than one day's lost production. Within four weeks, All-Brite was producing 110% of its former capacity at the old plant with a reduction of 18% in labor! We had expected a great deal from this system, and it had really worked out better than expected.

Where did our savings come from? Some savings were made in better material handling equipment and better

In assembly area, painted parts for All-Brite fluorescent fixtures are unloaded to left of picture, and move from left to right toward shipping department.

Management team at Fluorescent Fixtures, left to right: Bob Thallon, assistant sales manager and chief engineer; C. D. Buchanan, sales manager; Ernst Anders, president and founder; Jim Rutledge, controller; and R. H. Shaffer, works manager.

working conditions because of proper layout and adequate space. Some savings in both labor and materials were made by going to automatic cleaning and phosphatizing equipment. By far our biggest single saving, however, was in the installation of the electrostatic spray equipment. One day we had fourteen spray men, the next day we had two. One day we used 180 gallons of paint, the next day we used 75. Fantastic? It sounds so, but it is a fact. And, at the same time, production was increased.

Metal preparation

Our finishing system includes 425 feet of conveyor running at 6 ft. per minute. During loading it is at 10′ 6″ elevation, then runs up to 14′ 6″ to pass through a 68-foot washer and dry-off oven. Washing and phosphatizing consists of the following stages: (1) spray held at 155°F., (2) warm water rinse at 145°F., (3) cold water rinse, (4) chromating at 175°F., and finally into a dry-off oven at 350°F. for 2½ minutes.

Thereafter, this conveyor dips down to 12′ elevation during a 3-minute cool down period until it enters the loop of the electrostatic spray zone. This loop is 66″ in diameter and the parts are hung from either simple "S" hooks or, in the case of some small parts, on special "Christmas-tree" type workholders so that the work is about 18″ below the rotator. Rotators are placed at every six inches so that hanging centers with any multiple of six inches can be used. With this arrangement the eight-foot long pieces are about 18″ above the floor.

Electrostatic spray finishing

The 25″ diameter disc, which rotates at 900 rpm, moves up and down in the center of the loop at a speed of about 1 foot per second. The parts to be painted rotate about 2 revolutions per foot of conveyor travel so that all sides are exposed to the electrostatic spray. Paint metered through a variable speed gear pump is delivered by a ½″ o.d. plastic hose through the inside of the disc rotating motor shaft and is introduced continually and uniformly to the outer edge of the rotating disc on the under side of the disc. The disc itself is charged to about 90,000 volts d.c. Because of the strong field existing between the disc and the work, the paint is caused to atomize into a mist and each paint particle has a strong negative surface charge. The work, being of opposite polarity, attracts the paint, thereby eliminating overspray and causing a uniform deposition of paint.

When shorter pieces are run through the line, the stroke length is adjustable by means of limit switches which are mounted on lead screws. This is done without stopping the conveyor line.

Color changes are made by lifting the paint suction hose out of one barrel and putting it into another. The enamel used is a modified alkyd with high reflectance, which for the electrostatic spray is reduced 5 paint to 3 thinner to a viscosity of 17 seconds on a Zahn No. 2 cup. A non-circulating paint heater is used between the metering pump and the disc to help stabilize morning and afternoon temperatures. The temperature of the paint on the disc remains at about 90°F. In this way, it is not necessary to make solvent adjustments during the day. Paint delivery adjustments are made as needed by simply turning a handle, thereby changing the speed of metering pump. Insofar as possible, parts are hung so as to present the same square feet per minute, thereby making a paint delivery change unnecessary.

Hand spray for touch-up

After traveling through the electrostatic zone, parts pass in front of a 12′ water-wash booth where two men hand spray for touch-up when required. Certain pieces which have shielded, or recessed, areas require hand spray to finish them off. This is done at an upper and lower level. When touch-up is not required, these two spray men help load small parts or do other work.

The electrostatic equipment is operated by John Blanco, finishing foreman, who also supervises the loading, cleaning and baking operations. Although hand touch-up is used only on about one-half the pieces painted, and then only a small area is touched up, paint usage by hand and by the electrostatic method is nearly the same, together totaling about one-third the former hand spray usage of 180 gallons daily. *to Page 63* →

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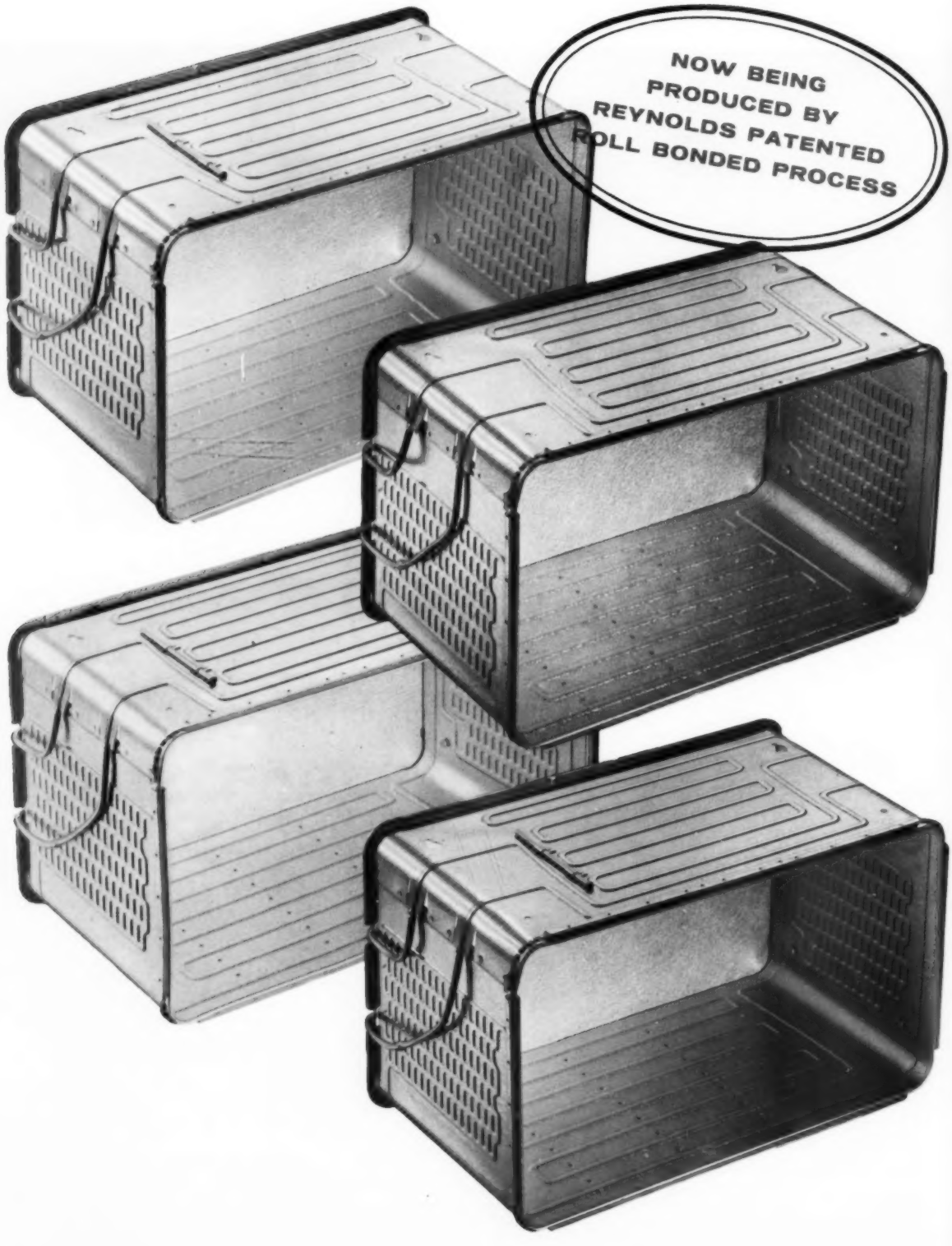

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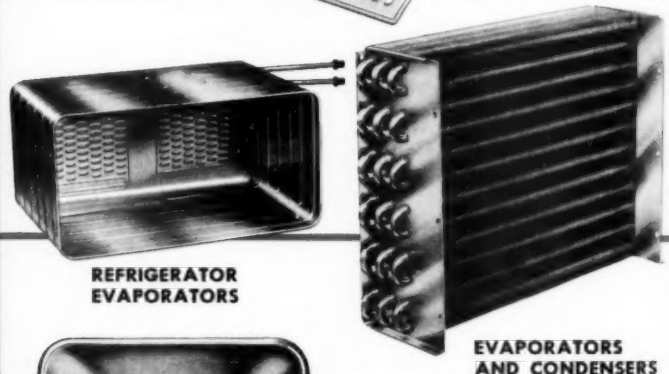

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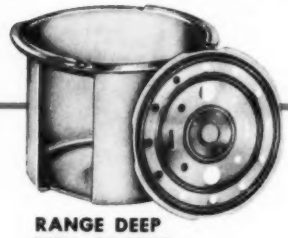

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The golden egg

→ *from Page 47*

if the design and the glass lining is not good enough to warrant a specification, they are not very reliable; consequently they do not feel justified in spending the added money to buy such an appliance.

Day & Night has been very active in the support of porcelain enamel for industry since 1946, and it is for this reason that I have tried to bring out facts that all of us must face.

I believe it is obvious that, if we want to avoid killing the goose before she lays any golden eggs, we should move with all possible haste to establish a working set of standards for the glass-lining of water heaters.

Adapted from a presentation before the 2nd Pacific Coast Conference of the Porcelain Enamel Institute.

New plant for All-Brite lighting fixtures

(Continued from Page 56)

We found, too, that it was possible to do about 10% more work on our one shift with the new set-up than we formerly did in two shifts. This is possible because of a 50% increase in line speed together with closer hanging of parts, and ability to coat everything satisfactorily the first time. After painting, parts pass through a flash-off zone and into an oven where they are baked for 12 minutes at 300°F. This oven is equipped with entrance and exit air curtains surrounding the oven openings to cut down heat loss. After baking and cool down, the conveyor passes by the unloading station which is at the head of the assembly line. The conveyor travels empty from this point to the loading station, a distance of about 75 feet.

A smooth flow of finished goods is obtained by taking in raw materials at the rear of the building, where both a railway spur and truck facilities are provided, and moving parts forward through fabricating, finishing and assembly to the front of the building where they are shipped out by conveyors onto trucks. Twelve to fifteen tons of steel per day are handled smoothly and efficiently in producing All-Brite's daily requirements of fluorescent fixtures.

APPLIANCE MEN TO MEET IN CINCINNATI, JUNE 6-8

The 23rd annual convention and supplier's exhibit of the Institute of Appliance Manufacturers will be held at the Netherland Plaza, Cincinnati, June 6-8.

The tentative program as announced by IAM is as follows:

June 6 — Meeting of board of trustees in the morning, followed by luncheon meetings of the Gas Heating and Solid Fuels Divisions.

A "Sales and Advertising Workshop", to be held in the afternoon, will feature the following speakers: Dr. James N. Morgan, assistant program director, survey research center, University of Michigan; Laurence Wray, editor of *Electrical Merchandising;* and W. Frank Fisher, vice president, The Floyd-Wells Company.

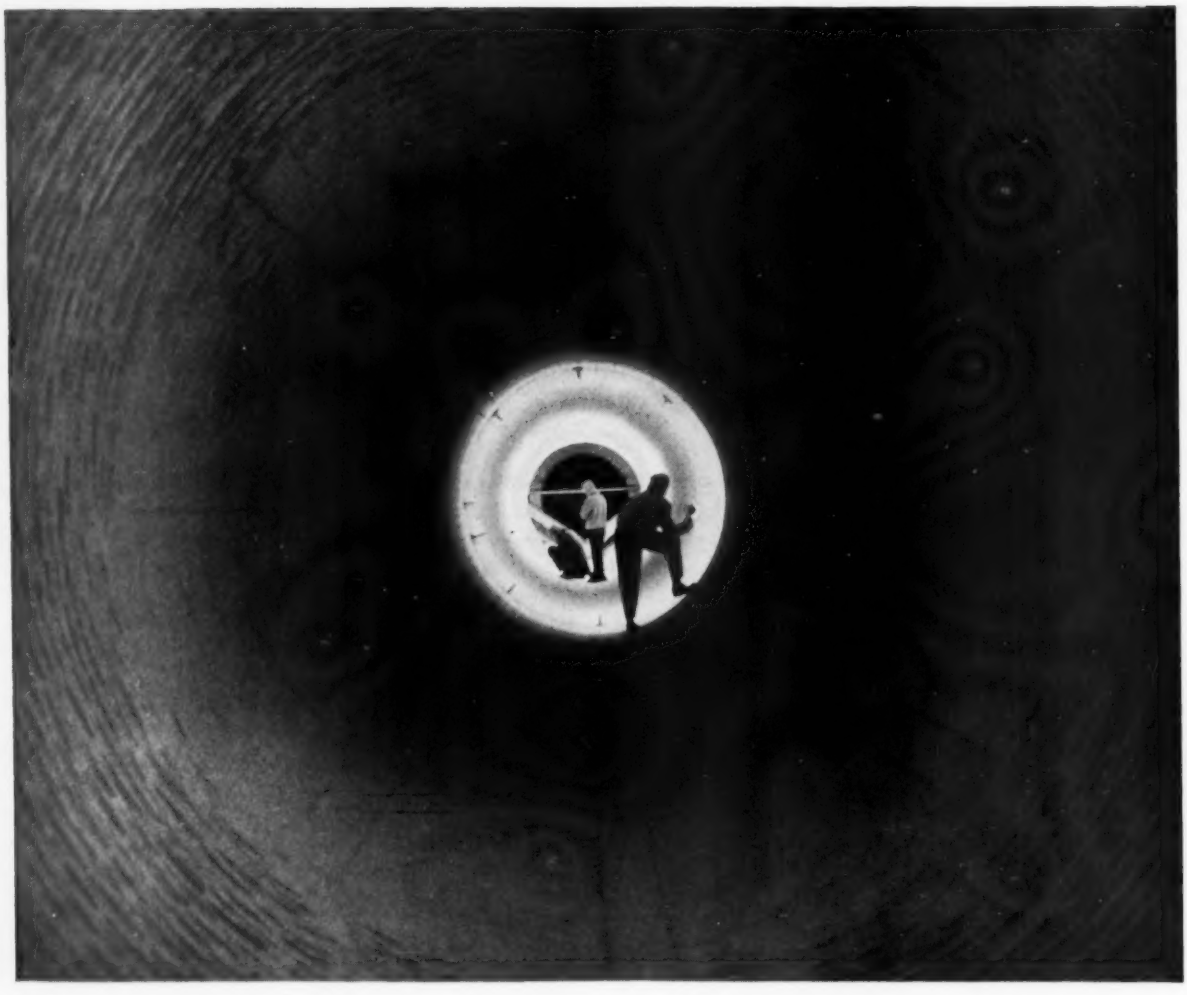
June 7 — The morning general session will be opened by F. Donald Hart, executive vice president, Temco, Inc., delivering "The President's Annual Report." He will be followed by the Hon. Thomas P. Pike, assistant secretary of defense, discussing "Defense Supply and Logistics." Concluding the general session will be an address on "Profit Potentials in an Expanding Market," by Roy C. Ingersoll, president and chairman, Borg-Warner Corp.

The Oil Division will meet in the afternoon which will also feature a concurrent "Manufacturing, Designing and Purchasing Workshop." The latter session will be presided over by W. M. Hollingsworth, director of purchases, Geo. D. Roper Corp. Speakers will include William R. Mabee, vice president, The Tappan Stove Co., and A. M. Blumenfeld, a member of the Society of Industrial Designers and head of the design group for Rohm & Haas Co.

June 8 — Concurrent morning sessions will include a "Top Management and Executives Conference," and a "Built-In Appliance Manufacturers Session."

Speakers at the latter session will include Tom Hughes, of Kitchens By Hughes, representing dealer viewpoint; E. A. Hart, president, Dayton Chapter of American Institute of Architects, speaking for the architects; and William Weist, chief engineer, Place Enterprises, will discuss built-in appliances from the point of view of his company's extensive use of them in housing projects in northern Indiana and Illinois.

Candid finishfotos — *from recent West Coast conference of Porcelain Enamel Institute. Left to right: Ed Dietterle, Ferro; Glenn Simonton, Rheem; Paul Snively, AllianceWare; P. Kerins, Stauffer Chemical; N. D. Slevin, Hommel; and C. J. Garland, Pecora Paint. Other photos appeared in the May issue of* finish.



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Smelted into titania porcelain enamels, TITANOX-TG produces maximum opacity while TITANOX-TG-400 yields a blue-white tone. Recent research indicates that glazes can be self-opacified by titanium dioxide through the use of TITANOX-TG. Further, TITANOX-TG is invaluable in promoting acid resistance in dry process enamels as well as enamels for aluminum and glass decorating. Both the anatase and rutile types of TITANOX titanium dioxide pigments are widely used as mill-added opacifiers.

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American Ceramic Society annual meeting

including editorial briefs of papers from Enamel Division program

THE 57th annual meeting of the American Ceramic Society was held in Cincinnati, Ohio, the last week in April. Total registration was reported as 2,038 with headquarters for General Sessions and the Enamel Division program at the Netherland Plaza Hotel.

ACS officers installed at the meeting were: *President,* Robert Twells, Electric Auto-Lite Co., Spark Plug Division, Fostoria, Ohio; *president-elect,* Karl Schwartzwalder, A C Spark Plug Division, General Motors Corp., Flint, Mich.; *vice president,* R. S. Bradley, A. P. Green Fire Brick Co., Mexico, Mo.; *vice president,* John H. Isenhour, Isenhour Brick and Tile Co., Salisbury, N.C.; *vice president,* Kenneth C. Lyon, Indiana Glass Co., Dunkirk, Ind.; and *treasurer,* W. E. Dougherty, The O. Hommel Co., Pittsburgh, Penna.

Past presidents include R. R. Danielson, Metal & Thermit Corp., Carteret, N. J., and Ray W. Pafford, Acme Brick Co., Fort Worth, Tex.

Sixteen men were made Fellows of the Society at the meeting. Those among the sixteen who are associated with the porcelain enameling industry are: E. E. Howe, Chicago Vitreous Corporation, Cicero, Ill.; Clark Hutchison, Ingram-Richardson, Inc., Frankfort, Ind., and Wayne A. Deringer, A. O. Smith Corp., Milwaukee.

Enamel division report

Interest in the Enamel Division sessions is indicated by the fact that for several meetings the room was packed beyond seating capacity.

Following are editorial briefs of some of the papers presented before the ACS Enamel Division.

Determination of thermal conductivity of porcelain enamels

H. E. ROBINSON and J. C. RICHMOND, National Bureau of Standards, Washington, D. C. (presented by J. C. Richmond)

The thermal conductivities of ceramic coatings were determined by two methods. The first or "rod" method consisted of bonding a thin section of ceramic to the ends of two metal bars of known thermal conductivity. The thermal gradient along the composite bar was determined by the use of thermocouples placed along the bar. Measurements were made on five ceramic specimens from .010 to .020-inch thick, at temperatures ranging from 200°-800°F.

In the other ("disc") method, discs of three materials, six inches in diameter and up to ¾-inch thick, were cast and annealed slowly. These discs were placed over a small gas furnace and very delicate calorimetric measurements used to determine the heat flow through the discs. Calorimeter measurements on the top side of the disc depend upon very exact measurements of the condensation of steam. The measurements on the bottom of the disc were made with an optical pyrometer of the glowing filament type. The thermal conductivity was determined at temperatures from 950°F. - 1400°F.

Equations and diagrams were used to explain both methods.

Solution ceramics

S. W. BRADSTREET and J. S. GRIFFITH, Armour Research Foundation, Chicago, Illinois (presented by S. W. Bradstreet)

Bradstreet explained various methods of depositing non-brittle coatings of ceramic materials upon a wide range of dissimiliar solid surfaces. This novel and unique method involves spraying of dilute solutions containing zirconia, chromia, alumina, nickel, etc., upon heated (400° - 750°F.) solid surfaces.

It was pointed out that the solution used, dilution, temperature of the surface, spraying distance from the surface and degree of "wetting out"

Group photo of new fellows of American Ceramic Society, including three Enamel Division men seated in front row—E. E. Howe (2nd from left), Chicago Vitreous; Clark Hutchison (4th from left), Ingram-Richardson; and Wayne Deringer (5th from left), A. O. Smith.

are critical in obtaining good results. The material deposited is so fine that it is impossible to obtain X-ray patterns from it, denoting its non-crystalline form. Bonding appears to be due to molecular forces. When deformed, "solution ceramic" coatings powder but do not chip.

Effect of temperature on elastic properties of enameled steel

R. W. Cowan, A. W. Allen *and* A. L. Friedberg, University of Illinois, Urbana, Illinois (presented by R. W. Cowan)

Moduli of elasticity and rigidity of several different porcelain enamels and enameling iron were obtained by sonic methods at various temperatures. The method was based upon impressing sonic waves from an electronic speaker or "driver" upon samples at a rate of from 20 to 20,000 cycles per second. The electronic pickup receiver consisted of a phonograph pickup cartridge. The data was electronically recorded and analyzed. Equations and constants were presented which enable the elastic constant to be calculated for any enamel thickness in a temperature range of –20°F. - 1500°F.

SYMPOSIUM ON COLOR

Introduction to color

I. A. Balinkin, University of Cincinnati, Ohio

Mental perception of colors is based on factors which can be assigned to four sciences: physics — light source or radiation (sun); chemistry — material substance or modification; physiology — color vision or sensation (eye); and psychology — perception (brain).

Examples were given of the effect of light sources such as the influence of sodium vapor, ultra-violet light and infra-red light. Chemical aspects of color refer to the property of substances to transmit, absorb or reflect. Demonstrations were given to illustrate color vision as to the effect of backgrounds, separation and size. A simple illustration of lack of "color memory" was presented.

Instrumental methods of color and color difference measurements

R. S. Hunter, Hunter Associates Laboratory, Falls Church, Virginia

Absolute color cannot be measured with accuracy without very carefully controlled conditions. Color differences can be measured by "hitching-post" techniques using permanent ceramic standards of glass, tile or porcelain enamel. Color measurements rely upon physical analyses (spectrometric properties and geometric properties) and visual observation and comparison. Hunter described the types of instruments used for color and color difference measurements as basically spectrophotometers, photoelectric tristimulus reflectometers and photoelectric tristimulus colorimeters.

ACS officers, left to right, front row: Robert Twells, president; Karl Schwartzwalder, president-elect; R. S. Bradley, vice president. Back row: John Isenhour, vice president; R. R. Danielson, past-president; W. E. Dougherty, treasurer; R. W. Pafford, past-president; K. C. Lyon, vice president.

Evaluation of small color differences — visual observations

J. C. Richmond and W. N. Harrison, National Bureau of Standards, Washington, D. C. (presented by J. C. Richmond)

Using 200 colored porcelain enamel samples consisting of 15 standard color specimens well distributed within color solid and 12 specimens for each color differing but slightly from the standard, 34 observers in ten laboratories (15 unexperienced observers and 19 experienced) selected one unit difference in the sample from standard and arranged others in order, assigning unit or fractional unit differences from standard. Of the 6,000 estimates made, it was found that the highly saturated colors near edge of color solid had little correlation between experienced and inexperienced observers. The difference in hue, saturation and lightness was recognized, but degree of difference was not recognized by inexperienced observers with accuracy.

Evaluation of small color differences — spectrophotometric determinations

H. J. Keegan, National Bureau of Standards, Washington, D. C.

Recent developments have shown that spectrophotometers equipped with automatic integrators wherein the spectrophotometric data converted to tristimulus colorimetric values and extended to color difference units may prove to be a major factor in the determination of an adequate system for expressing small color differences; of an adequate colorimeter to measure this small color difference; and of any changes in instrument, computation formula, or general system to meet requirements applicable to the needs of the enamel industry. Other color difference evaluation methods referred to included Munsell Books, Intersociety Color Tests, Color Difference Tests, Continental Can Corp., Color Harmony Book and Color Eye.

Evaluation of small color differences — colorimetry

H. K. Hammond, III, National Bureau of Standards, Washington, D. C., and R. S. Hunter, Hunter Associates Laboratory, Falls Church, Va. (presented by R. S. Hunter)

Color differences obtained by measuring surfaces by diffused light and converted to National Bureau of Standards units suggested by Judd were compared with those determined visually and reported in Part I. There are five basic equations for different instruments used including the Judd visual chromaticity-difference colorimeter and four photoelectric tristimulus colorimeters of the types designed by Hunter.

Past, present and future influence of color

Carl E. Foss, consultant, Princeton, N. J.

The basic problem in color is satis-

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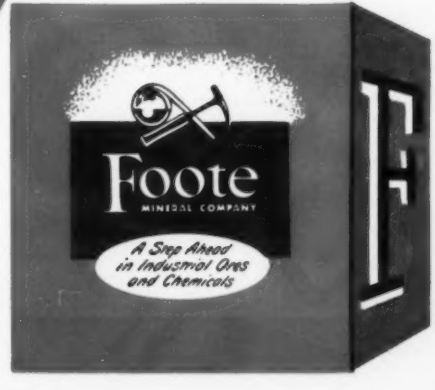

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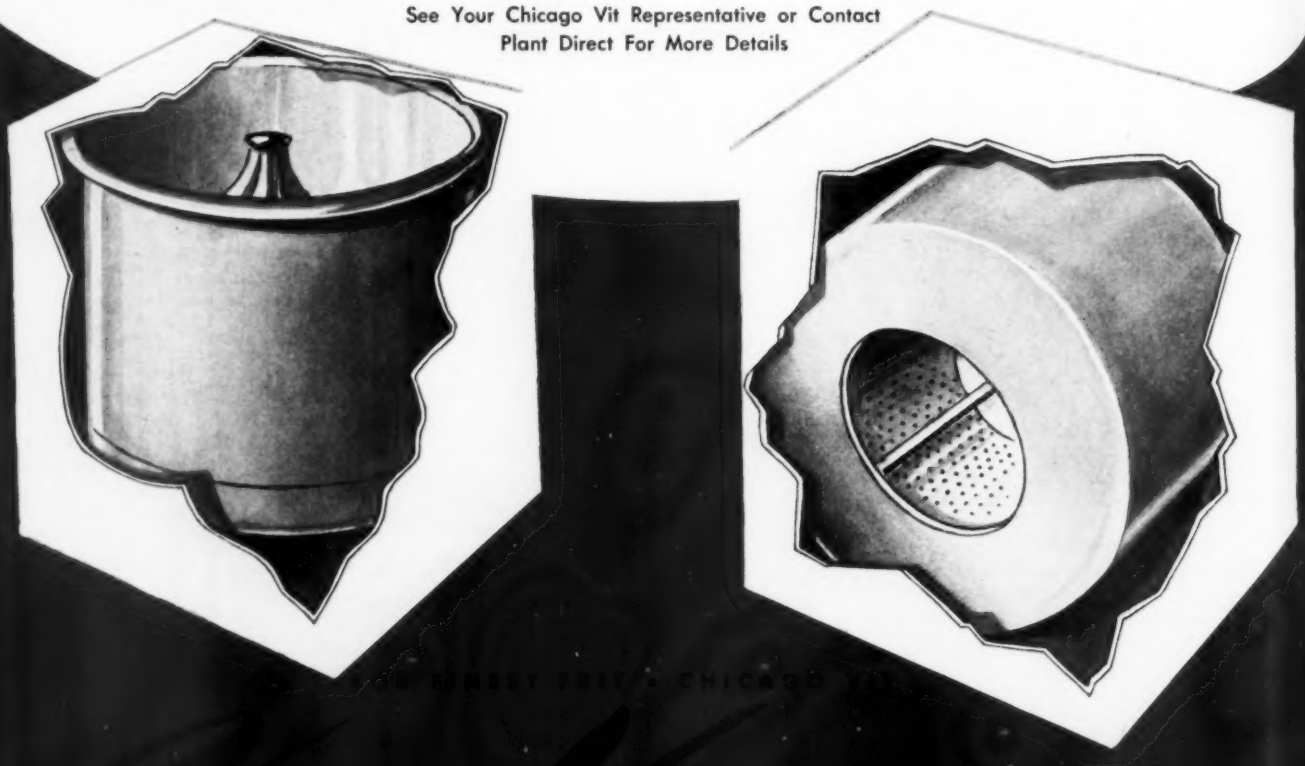

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fying the customer's needs. The manufacturer can avoid excessive inventories by minimizing the number of colors used and show the product to advantage in many different situations. Colors may be divided into two categories — basic colors which are always present and should be considered first, and colors of fashion which cannot always be predicted.

Establishing a color control program utilizing instrumentation

R. F. PATRICK, Pemco Corp., Baltimore, Md.

The first step in establishing a color control program is to set up specifications on reflectance and chromaticity data on carefully standardized instruments. Tolerance limits are based on end-point use and practicability in production. The author recommended the use of "limit areas" on plotted curves and diagrams based on the Adams Formula to see that production variations fall within the limit areas specified.

Color control in the porcelain enamel industry

H. I. BECKER, JR. and F. L. MICHAEL, General Electric Co., Louisville, Ky. (presented by F. L. Michael)

To match color in organic and ceramic finishes and plastic, standard panels are prepared in porcelain enamel and spectrophotometer curves are run with both reflectance and color plotted. An area of acceptability of color is established. In controlling porcelain enamel color, color checks are made on each mill of enamel and adjustment made until spectrophotometric data shows the color falls within the area of acceptability. The plotted acceptable area should be based on processing variables, thickness, burning, etc. Visual inspection under several different lights is usually acceptable.

Hydrogen behavior in glass coating of steels and alloys

G. P. K. CHU and E. A. SANFORD, The Pfaudler Co., Rochester, N. Y. (presented by G. P. K. Chu)

In the glass-steel reaction, hydrogen evolved during enameling results in reboiling blisters, and that evolved after enameling results in cooling blisters and fishscale. Different metals or the same kind of metal with different treatments responded differently toward the hydrogen behavior. Enamel fired on steel pickled without nickle dip displayed fishscale, but this enamel applied on the same steel prepared with nickel dip did not show the fishscale defect.

Relation of viscosity, nuclei formation and crystal growth in titania-opacified enamel

TIN BOO YEE and A. I. ANDREWS, University of Illinois, Urbana, Ill. (Presented by Tin Boo Yee)

Crystallization of titanium at temperatures ranging from 650°C. to 1300°C. was studied by five different methods. The molten enamel viscosity measurements were then presented with the use of graphic curves. Using the petrographic microscope, crystal growth was observed under transmitted and reflected light, and it was found that crystals in fired enamel increased with increased heat and then fell off, disappearing at 1100°C.

The collodion film method was used to prepare specimens for study by an electron microscope. The X-ray technique involved firing a layer of frit on platinum foil at 1100°C. and then refiring at 741°C. to 1105°C. to recrystallize. Slides of the X-ray patterns were presented to show that anatase crystals increase and then fall off on heating. Rutile crystals react similarly but are retained longer. Thermal analysis was explained by the use of curves. It was found that, as the temperature increased from 700°C. to 1100°C., the color of the samples viewed under reflected light changed from light blue to white and then to cream white.

Surface and sub-surface abrasion of porcelain enamels

J. H. GILES, Porcelain Enamel Institute, Washington, D. C., J. C. RICHMOND and W. N. HARRISON, National Bureau of Standards, Washington, D. C. (presented by J. H. Giles)

A new apparatus for testing abrasion resistance, both surface (gloss) and sub-surface (matte), of porcelain enamel was described. Silica glass sand is used to test surface abrasion at time increments of five minutes. Sub-surface abrasion is tested with abrasive borundum for a 45-minute period consisting of three intervals of 15 minutes each, using fresh abrasive for each interval. Enamels with a good resistance to surface abrasion may have poor resistance to sub-surface abrasion and vice versa. The end use of the enamel governs the test — surface abrasion test for household appliances where appearance is important and sub-surface abrasion test for industrial uses where wear and resistance are more important.

Torsion tests show advantages of thin porcelain enamel coats

F. W. BEALL and R. L. MYERS, Armco Steel Corp., Middletown, Ohio (presented by R. L. Myers)

Torsion data was presented of tests made of various thicknesses and types of enamel coats applied to specially selected sheets of regular enameling iron. White cover coat directly on steel in one and two coats and fires; ground coat only in one, two and three coats and fires; and ground coat plus cover coat in one, two and three coats and fires were tested. Ground coat only displayed better torsion than ground coat plus cover coat, which was also true for white cover coat only. In both cases, thinner coatings showed the best torsion.

Factors influencing the neutral point of porcelain enamels

D. C. BOWMAN, Chicago Vitreous Corporation, Cicero, Ill.

The neutral point was defined as the temperature at which stress equilibrium exists within a porcelain enamel-metal system. Neutral point, softening point and stress relief of four ground coat enamels were determined by use of electrical contacts attached to enameled expansiometer test rings. Upon heating from room temperature to neutral point, compressive stress in enamel was uniformly relived. Frit fusibility, type and fineness of silica and quenching in oil after firing were factors influencing the neutral point. Significant statistical correlation was reported between the neutral point, initial compressive stress, "annealed" compressive stress and softening point.

Thermal expansion of commercial cast irons and enamels for dry-process enameling

R. R. DANIELSON and D. V. VAN GORDON, Metal & Thermit Corp., Carteret, N. J. (presented by R. R. Danielson)

Chemical analyses of seven samples of cast iron were made of the iron before coating, after ground coating and after cover coating. Thermal expansions of the same samples were determined with a National Bureau of Standards quartz rod dlatometer. With high combined carbon, the thermal expansion of cast iron tended

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to increase. Slight differences in expansion between porcelain enamel and cast iron cause trouble in the fit of the enamel to the cast iron. A difference of seven or eight points in thermal expansion may cause chipping or crazing.

Method of stress determination in porcelain enamel coatings

G. E. SELBY and HARRY LA TOUR, Armco Steel Corp., Middletown, Ohio (presented by G. E. Selby)

A method whereby it is possible to measure residual stresses to the point of .000005-inches per inch of strain was described. The method consisted of peening gold into two .028-inch holes in a stretcher leveled sheet sample. Elaborate precautions were made to achieve coating thickness of 4 to 5 mils. The length measurements were made at indents in the gold spots after enameling the test strips and again after stripping the strips with hydrofluoric acid. The thickness of enamel determined the length of strip.

Calculation of thermal expansion of enamel glasses

C. F. TUNG and A. I. ANDREWS, University of Illinois, Urbana, Ill. (presented by C. F. Tung)

The oxide factors for calculating thermal expansion of enamels from 100°C. to 450°C. were obtained by establishing logarithmic relationships between oxide content of given enamels and observations of their thermal expansion characteristics. Comparisons made between the calculated data and thermal expansion curves obtained by the interferometer method showed they were in agreement.

FERRO ANNOUNCES STUDENT CONTEST WINNERS

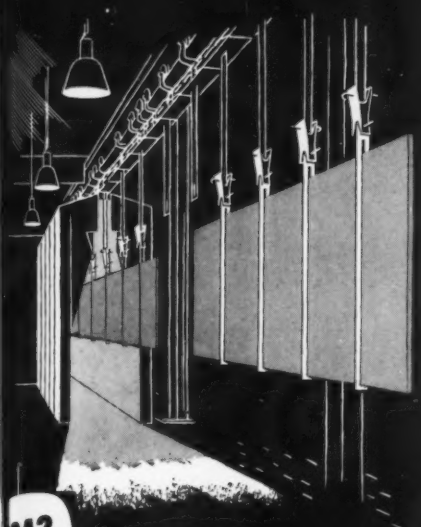
Myron J. Conway, Jr., graduate student, Clemson College, was awarded $500 as first prize in the Ferro Student Contest, at the 57th annual meeting of the American Ceramic Society in Cincinnati. Conway's paper was on "The Development of an Insulating Enamel".

Second, fourth and fifth prizes of $300, $50 and $50, respectively, were awarded to three University of Illinois students. Robert E. Cowan, graduate student took second place, with his paper on "A Quantitative Study of the Opacifying Crystals in Titania Enamels Using the X-Ray Spectrometer". Fourth prize went to Harold R. Bennett, senior, for a paper entitled "A Study on the Mechanism of

Coordinating committee — *for porcelain enamel industry's district enamelers' clubs met during American Ceramic Society convention in Cincinnati. Front row, left to right — Mel Gibbs, Inland Steel; Bob Foraker, Titanium Pigment; E. E. Howe, Chicago Vitreous; G. H. Spencer-Strong, Pemco; John Wurtz, Pacific Coast Ceramic News; Rud Porter, U.S. Steel. Second row—Joe Plankenhorn, Chicago Vitreous; Fred Sutphen (retired), Armco Steel; Jim Schiefferle, General Electric; James Giles, PEI fellow at Bur. of Stds.: G. B. Hughes, G-E; W. H. Pfeiffer, Frigidaire. Third row—Roger Fellows, Century Vitreous; William Anderson, Titanium Pigment. L. H. Schneider, G-E; Art Friedberg, University of Illinois; Ray Brown, Ceramic Industry; John Sincere, University of Illinois.*

1920 FERRO 1955

business grown big through SERVICE

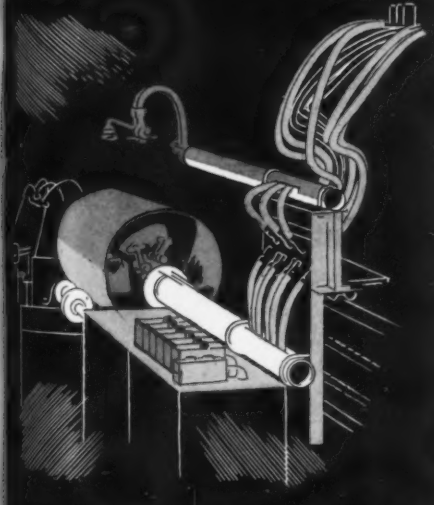


1942

Ferro's Engineering Division helps Porcelain enamelers convert to wartime production.

1955

Ferro Engineers introduce new automatic equipment approaching "automation" for Porcelain enameling.



FERRO CORPORATION

cleveland · nashville · los angeles

IN CANADA: FERRO ENAMELS, LTD., OAKVILLE, ONT.

Thermal Shock Failure of Porcelain Enamel". Roger T. Arnold, senior, was awarded fifth prize for his paper "Examination of Color Stability of Colored Enamels Using Smelter Added Color Oxides".

Third place, an award of $100, was presented to Barlane R. Eichbaum, graduate student, Rutgers University, for a paper entitled "The Development of a Single Fired Phosphorescent Porcelain Enamel which Matures at 1400° F."

The Annual Ferro Student Contest, open to all graduate or undergraduate students in the United States who are registered in Ceramics or Ceramic Engineering, has as its purpose "To incite original thinking in the field of porcelain enameling education on the part of the student and to create an interest for ceramic knowledge of the art".

Judging the contest this year were: Charles S. Pearce, secretary, American Ceramic Society; Edward Mackasek, retired managing director, Porcelain Enamel Institute; and Ben J. Sweo, director research and development coordination, Ferro Corp.

KANSAS LOOKS FOR GROWTH IN METAL STAMPING INDUSTRY

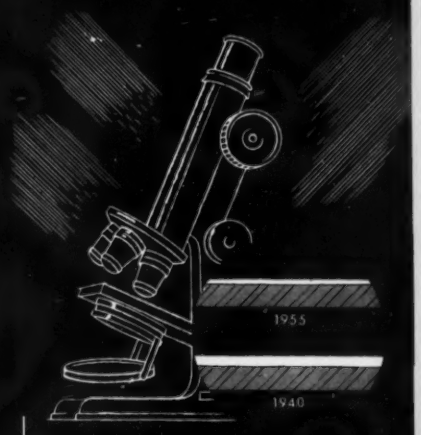
Kansas' rapid growth as an industrial state is creating new market opportunities for the metal stamping industry, according to a report issued by the Kansas Industrial Development Commission.

Midwest Research Institute, in a six-month study for the commission, found that Kansas industry in 1953 provided a metal stampings market of 19 million dollars, 17 million more than Kansas' total production of 2 million dollars in the industry.

There is a growing concentration of automobile and aircraft assembly plants in the Kansas area, the Midwest study said, which seems to encourage considerable expansion of the metal stampings industry in Kansas. Major consumer industries of metal stampings products in Kansas as listed by Midwest were: motor vehicles, household utensils, aircraft equipment and aircraft, and electrical appliances.

1920 FERRO 1955

A business grown big through SERVICE

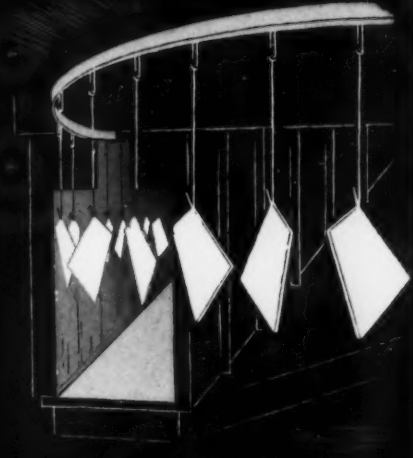


1945

Ferro introduces first Titanium Frits drastically reducing thickness of Porcelain enamel cover coats.

1955

Wide use of Titanium Frits saves P. industry **millions** of dollars a year.



FERRO CORPORATION

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IN CANADA: FERRO ENAMELS, LTD., OAKVILLE, ONT.

A report on COLOR in the home appliance field

THE finish LINE

(continued from May *finish*)

Fiesta green and yellow, plus copper, for Florence

Florence Stove Company is featuring gas range models available in Fiesta Green and Fiesta Yellow — as well as a new model with a copper porcelain finish.

Robert H. Taylor, president, stated that "more and more attention is going to color in appliances." He added that their newest color, copper porcelain, has received much favorable comment.

Detroit-Michigan Stove sees growing color trend

Highland green and Sahara gold

In reporting on the color policy at Detroit-Michigan Stove Company, a spokesman for Mr. John M. Storm, sales manager, had this to say:

"Last year, we introduced two color ranges in our Detroit Jewel line, our Highland Green and Sahara Gold.

"We have found an increasing amount of acceptance among the housewives of America as far as color appliances are concerned, and a far greater willingness on the part of dealers throughout the country to display color appliances in prominent locations in their stores.

"We plan on continuing the use of color in our appliances and expanding the use of color if it is demanded in range series in which we do not furnish it at the present time.

"We are definitely of the opinion that there is a color trend in appliances, and that it will continue and will grow."

Frigidaire reports that color attracts customers

The following electric appliances made by the Frigidaire Division of General Motors Corporation are available in Sherwood Green or Stratford Yellow, as well as white: refrigerators, ranges, clothes washers, clothes dryers, food freezers and dishwashers.

In a statement to *finish*, H. F. Lehman, general sales manager for Frigidaire, reported that "while colored appliances do not represent any sizeable part of our business, we think it is altogether possible that industry sales of colored appliances will reach 10% in the not too distant future."

Continuing, Lehman said: "Due to the novelty of colored appliances and their attractiveness in advertising and displays, they were unquestionably instrumental in attracting a

Left: This 36" Florence gas range is available in Fiesta yellow or green shades to blend with or match other color schemes. Another model is available in copper porcelain.

Right: This high broiler gas range, in the Imperial series made by Detroit-Michigan Stove Co., is available in either Sahara gold or Highland green.

is Frigidaire electric range features a surface oking unit equipped with a heat-minding unit for slow-cooking foods.

This 15-cubic-foot Frigidaire refrigerator-food freezer combination is equipped with two vertical doors. There is no divider between, and, when the doors are open, full-width shelves roll out all the way.

great many customers who ultimately bought our white appliances. This will no doubt be a lesser sales factor from now on since other companies are also producing appliances in color, and the novelty will wear off."

"30% of major appliances sold will be in color"

sunrise yellow and lagoon green for Conlon-Moore

Regarding the use of color in laundry appliances, Harry Friedman, general sales manager, Conlon-Moore Corporation, stated:

"Color in washing machines and ironers was a very difficult decision. When our colored appliances were first introduced, the public stood back, admired, and remarked as to how beautiful they were. Colored appliances evidently were considered as display merchandise only, for it took a few years before they were actually accepted by the public.

"The demand has grown steadily to the point where we now include in our production a good percentage of colored appliances. I believe that the demand will grow to a point where at least 30% of major appliances sold will be in color."

Magic Chef uses House & Garden color

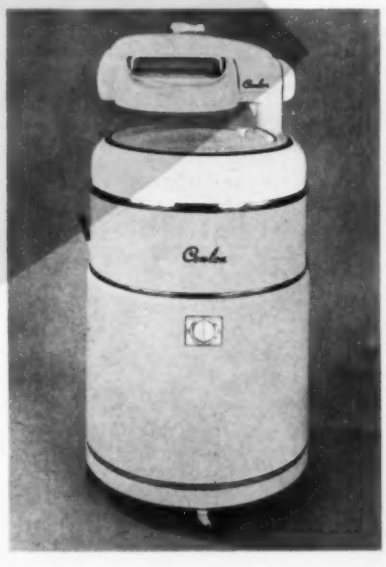
willow green

In a report to *finish* in regard to present color plans at Magic Chef, Inc., Mary Williamson had this to say, "At this time, Magic Chef makes only one gas range in color. It is the 36-inch Color-Chrome model in Willow Green porcelain enamel and gleaming stainless steel. The hue is a House & Garden approved color."

"Top of the range only" in color

Tennessee Stove Works of Chattanooga, Tennessee, reports work with color over a period of months but they have now changed their color plan to experiment with the application of color to range tops only.

L. H. Caldwell, Jr. in a report to *finish* added: "We have made both gas and electric ranges in two different colors the past six months and have found sales on them rather spotty. Dealers think they are going to like them, but they get them on their floor and they do not move like a regular white appliance."



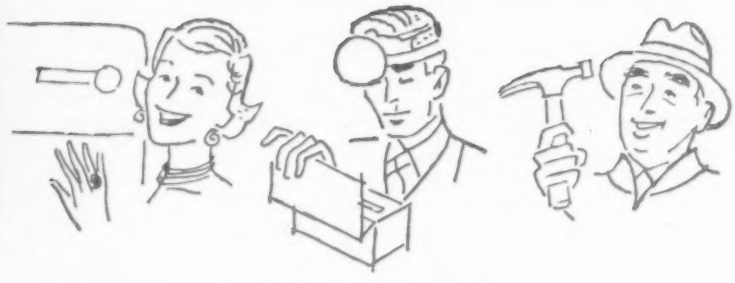
Conlon-Moore's laundry appliances (washers and ironers) are available in sunrise yellow or lagoon green.

Question:

Which finish do quality-conscious buyers ALWAYS respect because it is both durable *and* beautiful?

Answer:

PORCELAIN ENAMEL



A porcelain enamel finish on ANY product . . . be it industrial or consumer . . . immediately stamps that product as one that will back up every claim made for its durability. *Beauty* the buyer can see—but whatever his interpretation of *durability*—the seller never has to apologize for porcelain enamel.

Such selling confidence is possible because today's porcelain enamel literally can be tailored to specific requirements of color, weight, acid resistance, alkali resistance, etc.

The experience and knowledge of Pemco . . . in whose laboratories have been developed many of the advances in porcelain enameling . . . are available to product designers, manufacturers and enamelers.

CORPORATION • BALTIMORE 24, MARYLAND

Manufacturers of "*The World's Finest*" Porcelain Enamel Frits for steel; cast iron and aluminum; Coloring Oxides; Screening Pastes; Glaze Frits; Body and Glaze Stains; Underglaze and Overglaze Colors; Vitrifiable Glass Colors.

KELVINATOR NAMES TRAVIS & JEFFREY; PACKARD RESIGNS

George Romney, chairman and president, American Motors Corp., Detroit, Mich., has announced the election of Walter Jeffrey as vice president in charge of sales for Kelvinator Div.

B. A. Chapman, vice president and general manager of Kelvinator, has announced the appointment of Homer L. Travis as general sales manager.

D. A. Packard, Kelvinator general sales manager, has resigned.

WHIRLPOOL ELECTS DIRECTORS

Stockholders of Whirlpool Corp., St. Joseph, Mich., have elected Fred R. Funk a director replacing P. E. Geldhof, resigned. Incumbent directors reelected were: Robert E. Brooker, W. Yost Fulton, Elisha Gray II, Edward Gudeman, Robert V. Horton, Maynard H. Murch, Frederick S. Upton and Robert C. Upton.

RHEEM RE-ELECTS DIRECTORS; THREE-MONTH EARNINGS RISE

Stockholders of Rheem Mfg. Co., Chicago, have re-elected the following members of the board of directors: C. V. Coons, vice president; G. M. Greenwood, vice president and treasurer; Herbert E. Hall, attorney; A. E. Ponting, vice president of Blyth & Co., San Francisco; R. S. Rheem, president; D. L. Rheem, executive vice president; W. K. Rheem, assistant to executive vice president; Gen. A. C. Wedemeyer, vice president; and W. E. Zander, senior vice president.

Net income for the first three months of 1955 was $1,562,906, compared with $1,426,506 for the similar period of 1954.

SERVEL NAMES MORRILL V P

John R. Morrill has been elected a vice president of Servel, Inc., Evansville, Ind., and general manager of the commercial refrigeration division, announced Duncan C. Menzies, Servel president.

Previously, Morrill was vice president and general manager of Gibson Welding Supplies, Spokane, Wash.

2-COMPANY MERGER FORMS NATIONAL-U.S. RADIATOR CORP.

National-U.S. Radiator Corp. came into existence on April 1 as a result of the merger of The National Radiator Co., Johnstown, Pa., and United States Radiator Corp., Detroit, Mich.

W. C. McCord, president and a director of U. S. Radiator, has been named chairman of the board of National-U. S. Radiator Corp., and Theodore B. Focke, president of National, is president.

IRON FIREMAN NAMES HANDLEY

R. K. Handley has been named plant manager of Iron Fireman Mfg. Co.'s main Cleveland plant, president Wayne Strong has announced.

NEW KAWNEER PLANT

The Kawneer Co., Niles, Mich., has announced plans to build a second plant in Cynthiana, Ky., containing over 60,000 square feet of floor space and a single story brick office building. The cost is estimated at about $250,000.

NORGE APPOINTS PLANO ELECTRIC RANGE SALES MGR.

Appointment of John A. Plano as electric range sales manager of Norge Div., Borg-Warner Corp., Chicago, has been announced by W. C. Conley, Norge director of product managers.

Plano was formerly a division sales manager for Norris-Thermador Co.

RISHEL TO AMANA

J. A. Rishel, Jr., formerly general sales manager, Deepfreeze Div., Motor Products Corp., has joined Amana, Inc., Amana, Iowa, to conduct special field projects, announced E. L. Hinchliff, Amana sales manager.

ANDERSON, WESTINGHOUSE PORTABLE APPLIANCE MGR.

The appointment of John J. Anderson as manager of portable appliances

for Westinghouse Electric Appliance Div., Mansfield, Ohio, has been announced by John H. Ashbaugh, vice president.

Anderson, formerly manager of laundry equipment, succeeds Robert M. Oliver, who has resigned.

GAS WATER HEATER SHIPMENTS SET NEW RECORDS

Automatic gas water heater shipments set an all-time first quarter high in 1955 with 674,300 units for a 27.9% increase over 1954, according to the Gas Appliance Manufacturers Association.

Edward R. Martin, director of marketing and statistics, reported that March shipments were the highest on record with 259,600 units, an increase of 38.2% over 1954.

NEMA FEBRUARY FIGURES

Sales of electric ranges during February totaled 125,351, according to the National Electrical Manufacturers Association. Electric household refrigerator sales were 318,812. Electric storage water heaters, 57,063, and electric farm and home freezers, 58,429.

GAS FURNACE SHIPMENTS UP 51.2% OVER '54

Edward R. Martin, Gas Appliance Manufacturers Association, director of marketing and statistics, reported that 155,000 gas-fired warm air furnaces were shipped to dealers and distributors during the first three months of 1955, an increase of 51.2% over the same period in 1954. March shipments set a record of 58,200 units for a gain of 45.9% over March 1954.

KAWNEER 3-MONTH FIGURES

Kawneer Co. (Niles, Mich.) sales for the first three months of 1955 were $6,700,000 compared with $5,300,000 for the same period of 1954, a gain of 26%, announced Lawrence J. Plym, president.

HOUSEHOLD LAUNDRY APPLIANCE SALES SET NEW RECORD

Factory sales of household laundry appliances in January-March were highest of any quarter in the industry's history, totaling 1,443,858 washers, dryers and ironers, compared to 1,432,216 in the final months of 1950, according to Guenther Baumgart, executive director, American Home Laundry Manufacturers' Association.

AMANA 1ST QUARTER SALES 47.5% OVER 1954

Sales of freezers and room air conditioners by Amana Refrigeration, Inc., Amana, Iowa, in the first three months of 1955 were 47.5% higher than sales for the same period in 1954 and the highest in company history, reports George C. Foerstner, executive vice president.

GAS RANGE SHIPMENTS RISE

Edward R. Martin, Gas Appliance Manufacturers Association director of marketing and statistics, reported that during March 217,000 ranges were shipped to distributors and dealers, compared with 188,200 shipped during March, 1954, an increase of 15.3%.

JAN.-MAR. VACUUM CLEANER SALES HIGHEST SINCE 1950

January-March factory sales of standard-size household vacuum cleaners totalled 870,953 units, topping all opening quarters in the industry's history since 1950, according to the Vacuum Cleaner Manufacturer's Association.

AIR-CONDITIONER SALES UP

Retail sales of room air-conditioners for the first quarter of 1955 were nearly 30% over 1954, according to the Air-Conditioning and Refrigeration Institute.

BREAK GROUND FOR NEW WHIRLPOOL OFFICE BUILDING

Ground breaking ceremonies have been held in St. Joseph, Mich., for construction of a new $1,500,000 administration office building for Whirlpool Corp., it was announced by

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NATIONAL HOUSEWARES MFRS. ASSN. ELECTS OFFICERS

C. M. McCreery, vice president, Revere Copper and Brass, Inc., Rome Mfg. Div., Rome, N. Y., has been elected president of the National Housewares Manufacturers Association, succeeding S. L. Hanssen, president, Hanson Scale Co., Northbrook, Ill., who remains as a director.

W. E. O'Brien, vice president, Toastmaster Products Div., McGraw Electric Co., Elgin, Ill., was elected vice president, and C. O. Hamilton, vice president, Hamilton Mfg. Corp., Columbus, Ind., was elected treasurer.

The following were elected members of the executive committee: McCreery (chairman) and O'Brien, J. R. Caldwell, president, Wooster Rubber Co., Wooster, Ohio, and J. A. Kaplan, Joseph A. Kaplan & Sons, New York City.

A. W. Buddenberg was named executive secretary for his 13th consecutive term. Dolph Zapfel was named assistant executive secretary.

Photo taken at annual meeting of National Housewares Manufacturers Association.

Donald W. Alexander, vice president, operations.

The completely air conditioned building will be situated in an 86 acre wooded plot. Construction is of stone and brick on steel. The building is to be completed by the end of 1955.

KELVINATOR NAMES LELIVELT MGR. OF MANUFACTURING

Appointment of J. W. Lelivelt to the new post of manager of manu-

facturing, Kelvinator Div., American Motors Corp., Detroit, Mich., has been announced by B. A. Chapman, vice president and general manager.

Lelivelt had been works manager of the Grand Rapids plant for seven years. George H. Beld has been named to fill Lelivelt's position.

FRIGIDAIRE SALES UP 25%

Retail sales of Frigidaire major appliances during the first quarter of 1955 were more than 25% greater than the same period last year, Harlow H. Curtice, president of General Motors, has announced.

KYLE & PRIDHAM ENTER TAPPAN QUARTER-CENTURY CLUB

Two officials of The Tappan Stove Co., Mansfield, Ohio, have been initiated into the Tappan Quarter-Century Club.

They are Verne O. Kyle, general manager of the Murray, Ky., plant and Chester A. Pridham, district

NICKELOID METALS more than a metal!

You by-pass 3 out of 5 basic production steps . . . . cut costs 15 to 20 per cent or more when you use the Nickeloid Method of producing plated metal parts and trim. That's because Nickeloid Metals are PRE-plated in durable, uniform finishes of chrome, nickel, copper or brass; require no cleaning, plating or polishing.* And you don't have to pamper these versatile metals to retain their beautiful mirror-like finishes. Stamp, blank, bend or draw . . . they fit right into standard production techniques.

The Nickeloid Method eliminates three costly steps

No cleaning, plating, polishing. Just fabricate and assemble. 2 steps instead of 5! Nickeloid Metals are also available with Mar-Not protective coating, a fabrication and handling aid.

*Pre-plated to base metals of steel, zinc, copper, brass and aluminum. Available in sheets and coils, interesting patterns and finishes.

SEND FOR FREE SAMPLER-SELECTOR

In handy slide-chart form, gives specifications, finishes and typical uses of Nickeloid Metals. 8 metal samples. Request yours, on your company letterhead.

NICKELOID METALS SINCE 1890 NM

Sales offices in most principal cities

AMERICAN NICKELOID COMPANY, Peru 11, Illinois

manager in the New York-New Jersey area.

Kyle started with Tappan as a pipethreader in 1930; Pridham started in 1930 as a territory representative.

JACOBSON NAMED FELLOW OF QUALITY CONTROL SOCIETY

The American Society for Quality Control has announced the election to Fellow Grade of Henry J. Jacobson, quality control manager, Grand Sheet Metal Products Co., Melrose Park, Ill. He is past president and national director of the Chicago Section.

WESTINGHOUSE SALES UP

Sales of Westinghouse electric appliances set a record high during the first quarter of 1955, according to John H. Ashbaugh, vice president.

Unit sales from distributors to dealers showed a 16% gain, and sales of major appliances alone were approximately 25% ahead of 1954.

BORG-WARNER NAMES INGERSOLL BOARD CHAIRMAN

Roy C. Ingersoll, president, Borg-Warner Corp., Chicago, has assumed the title of president and chairman of the board following action by the corporation directors. The post had been vacant since the death of C. S. Davis in July, 1954.

CRANE'S RUMLEY RETIRES

The retirement of Vincent P. Rumely, senior vice president and member of the board of directors, Crane Co., Chicago, Ill., has been announced.

Rumely became associated with Crane in 1937 as a production engineer. Previously he had served with the Buick and Hudson Motor Car companies.

NORGE SALES UP $52,484,289 IN YEAR ENDING MAY 1

Sales volume of the Norge Div., Borg-Warner Corp., Chicago, Ill., for the year ending May 1 totalled 112% — from $46,660,428 to $99,144,718 — over the corresponding 12 months ending May 1, 1954.

WHITE MOTOR ELECTS OFFICERS

Directors of The White Motor Co., Cleveland, Ohio, have announced the election of Robert F. Black to the newly created position of chairman of the board and his re-election as president and chief executive officer.

Vice presidents J. N. Bauman, V. W. Fries and E. S. Reddig have been named executive vice presidents.

KELVINATOR PLANT APPOINTMENTS

Two top manufacturing staff appointments have been announced by

DON E. DEVRIES

JOHN W. SCHUCK

George H. Beld, works manager of the Grand Rapids plant, Kelvinator Div., American Motors Corp.

John W. Schuck has been named assistant works manager, and Don E. DeVries has been named production manager.

ADMIRAL NAMES STEELE TO MARKET RESEARCH POST

Appointment of Edward P. Steele as manager of market research, Admiral Corp., Chicago, has been announced by W. C. Johnson, vice president of sales. Steele has been assistant manager of the department since 1953. He succeeds Robert L. Anderson, resigned.

STEWART-WARNER FIGURES

Stewart-Warner Corp., Chicago, had net profit for the first three months of 1955 of $1,116,000, James S. Knowlson, board chairman, and Bennett Archambault, president, have announced. This was nearly 40% over the first quarter of 1954.

COBELL APPOINTS CHAPPELL CHIEF ENGINEER

George A. Chappell, Jr., formerly vice president of engineered products, Automatic Firing Corp., St. Louis, Mo., has been appointed chief engineer of Cobell Industries, Inc., Fort Worth, Texas, the company has announced.

DEERING NAMES HERZOG

The appointment of R. A. Herzog, formerly design engineer with Crosley Div., Avco Mfg. Corp., as chief engineer of the Deering Air Conditioning Co., Cincinnati, Ohio, has been announced by Tom Deering, president.

PEERLESS BEGINS $350,000 FAN & BLOWER DIV. PLANT

Peerless Electric Co., Warren, Ohio, has broken ground for a $350,000 plant to house its Fan & Blower Div., Ralph Kroehle, president, has announced.

The new manufacturing building, part of a half-million dollar expansion program, will give the division thousands of additional square feet of space and permit the company to double its present fan and blower volume.

CROSLEY NAMES CHRISTIAN

John C. Christian, formerly chief, armament staff unit, Boeing Airplane Co., has joined Crosley Div., Avco Mfg. Corp., Cincinnati, Ohio, as manager of plans and programs for the defense operations, announced Donald B. Mason, director of engineering, Crosley Government Products Div.

DR. MARK TO SPEAK AT PAINT, VARNISH FEDERATION MEETING

Dr. Herman F. Mark, director, Polymer Research Institute at the

Polytechnic Institute, Brooklyn, N. Y., has been selected to deliver the annual Joseph J. Mattiello Memorial Lecture at the annual meeting of the Federation of Paint and Varnish Production Clubs, October 3-5 at the Hotel Statler, New York City.

Dr. Mark, a polymer scientist, has announced the title of his paper to be "New types of high polymers and their application in paints and varnishes."

BORG-WARNER & BYRON JACKSON HEADS PLAN MERGER

R. C. Ingersoll, president, Borg-Warner Corp., Chicago, and E. S. Dulin, president, Byron Jackson Co., have announced that they have agreed and will recommend to their respective boards of directors that the two companies merge. Dulin has agreed to also recommend that the Byron Jackson shareholders approve the plan of merger.

Borg-Warner manufactures automotive, aircraft and agricultural im-

"This Warco's A Real Press" —

says experienced Press Operator

"I've worked medium and light presses for more than eight years," says press operator John Gallik, of the Midland Steel Products Co., Cleveland, "and this Warco 200-ton OBI is a real piece of machinery." Gallik's employers, the Midland people, one of the nation's foremost producers of automobile and truck frames, go along with the operator's opinion.
Nine years ago Midland bought their first Warco, and on the basis of performance have since added 49 others in various types and sizes. Midland, like so many of the nation's top manufacturers, finds one Warco invariably leads to another, and their press operators are happy about it.

Federal WELDERS
Warco PRESSES

The Federal Machine and Welder Company
WARREN, OHIO

plement parts and household appliances. Byron Jackson is a manufacturer of centrifugal pumps, oil field tools and services, electronic devices and nuclear power components.

METZDORF TO BLAST FREEZE

George R. Metzdorf, formerly vice president in charge of manufacturing for McCray Refrigerator Co., Kendallville, Ind., has assumed a similar post with the Blast Freeze Corp., Park Ridge, Ill.

FINISH NAMES CONROW WEST COAST REPRESENTATIVE

Dana Chase Publications, Elmhurst, Ill., has announced the appoint-

ment of J. W. Conrow & Co., Pasadena, Calif. as their West Coast sales representative for *finish*. Conrow & Co. will serve the eleven western states. J. W. Conrow, head of the organization, was associated with Printers' Ink Publishing Co. prior to forming his own company.

KELVINATOR APPLIANCE SALES 22% OVER 1954

Home laundry appliances, added to the Kelvinator line two years ago, have climbed to second place in total sales among all appliances produced by Kelvinator Div., American Motors Corp.

Walter Jeffrey, vice president in charge of sales, announced that sales are 22% ahead of 1954 for the six months ending March 31.

BALTIMORE-WASHINGTON ACS '55-'56 OFFICERS

At the spring meeting of the Baltimore-Washington Section of the American Ceramic Society the following officers were elected for the 1955-1956 term: James R. Crandall, chairman; Robert F. Patrick, vice chairman; and Terry F. Newkirk, secretary-treasurer.

FOUR TO BORG-WARNER BOARD

Four new members of the board of directors of Borg-Warner Corp., Chicago, have been elected by the stockholders. They are: R. S. Ingersoll, administrative vice president; L. G. Porter, administrative vice president; Robert W. Murphy, vice president and general counsel; and Albert Steg, treasurer and controller.

WALTERS SALES MANAGER OF LEONARD DIVISION

Appointment of L. E. Walters as sales manager for the Leonard Div. of American Motors Corp., Detroit, has been announced by D. A. Packard, Kelvinator general sales manager.

Walters had formerly been with Kelvinator since 1930, most recently as western regional manager.

AMERICAN CERAMIC SOCIETY NAMES TWELLS PRESIDENT

Robert Twells, vice president of Electric Auto-Lite Co., Toledo, Ohio, was installed as president of The American Ceramic Society at its 57th annual meeting in Cincinnati, Ohio.

Twells has been research associate and assistant superintendent of production for Champion Spark Plug Co., Detroit, research associate for AC Spark Plug Co., Flint, Mich., and manager of the spark plug division of Electric Auto-Lite.

DESIGN FIRM TO HELP DEVELOP SERVEL '56 REFRIGERATORS

Announcement of the appointment of Walter Dorwin Teague and Associates, New York, to work with staff engineers and product planners in developing Servel's 1956 refrigerators was made by John H. Wall, vice president and general manager, Servel home appliance division. Fred Eilers, product planning manager at Servel, will act in a liaison capacity between Teague and Servel.

CONLON-MOORE APPLIANCE PRODUCTION TO JOLIET

Production of household washers, ironers and vacuum cleaners by the Conlon-Moore Corp. has been transferred to the company's Moore Corporation factory at Joliet, Ill., Bernard J. Hank, president, announced.

The transfer enables the consolidation of appliance production, space heater manufacturing and foundry facilities all under one roof.

KELVINATOR KEY SALES APPOINTMENTS

George Romney, chairman and president of American Motors Corp., Detroit, has announced the election of Walter Jeffrey as vice president in charge of sales, Kelvinator Div.

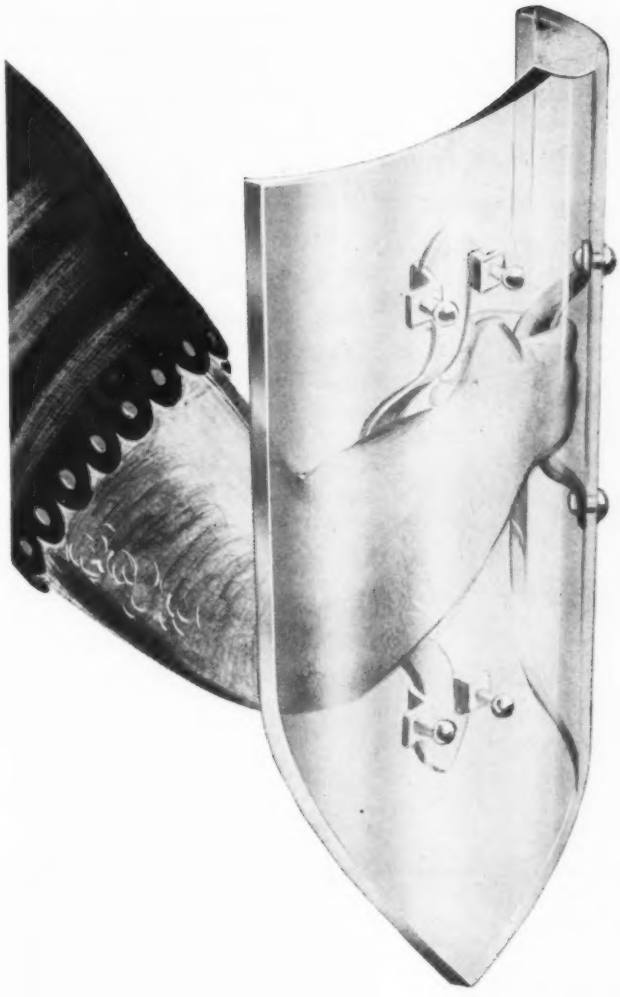
B. A. Chapman, vice president and general manager, Kelvinator Div., has announced the appointment of Homer L. Travis as general sales manager.

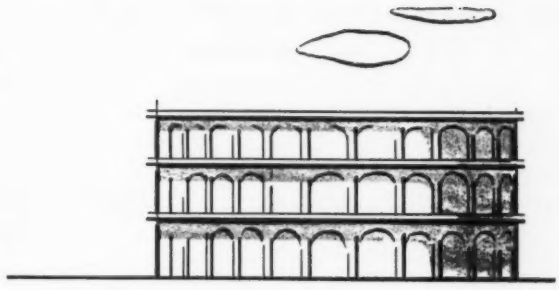
PREWAY PROMOTES SANDERSON

Robert J. Sanderson has been promoted to manager, heating appliance

department for Preway, Inc., Wisconsin Rapids, Wisc., announced L. W. Shaw, vice president and director of sales.

Previously, Sanderson was sales representative in Minnesota, North and South Dakota and Wisconsin.





this *Glass* shield,

while symbolic,

represents some of the things a master craftsman can do with glass. It can be bowed to fit any desired shape, it can be drilled and shaped to exact tolerances.

It can be tempered to impart extreme resistance to impact — that is why safety regulations demand glass as a safety barrier when danger exists.

Let Marsco's craftsmen-engineering team impart to your product all the advantages of glass

Let glass improve the utility of your product while it beautifies it.

Marsco

MARSCO MFG. CO., 2909 S. HALSTED ST., CHICAGO 8, ILL.

O. A. SUTTON NAMES DOLLAND V P — MANUFACTURING

Appointment of J. F. Dolland as vice president of manufacturing, The O. A. Sutton Corp., Wichita, Kan., has been announced by O. A. Sutton, president and board chairman.

Dolland was formerly general manager of Magnavox Corp., Greenville, Tenn.

NEW ASTE CHAPTERS

Presentation of charters to chapters in Keene, New Hampshire, and Oklahoma City, Oklahoma, has increased membership in the American Society of Tool Engineers to over 31,000 in the United States and Canada.

MITCHELL NAMES SMITH V P — PURCHASING

William E. Smith has been elected vice president in charge of purchasing, The Mitchell Mfg. Co., Chicago, announced B. A. Mitchell, president.

Smith has been with Mitchell since 1946 as director of purchasing.

MAHL MFG. LIQUIDATES

The Mahl Mfg. Co., Huntington Park, Calif., manufacturers of floor furnaces, has liquidated.

FLORENCE ANDERSON TO NORGE AS DESIGN COORDINATOR

Mrs. Florence B. Anderson, mechanical design engineer, has been appointed design and feature coordinator for Norge Div., Borg-Warner Corp., Chicago, it has been announced by V. C. Rice, vice president, manufacturing and engineering.

Formerly, Mrs. Anderson was chief design engineer for Deepfreeze.

WESTINGHOUSE NAMES LEE MGR. OF LAUNDRY EQUIPMENT

The appointment of Jack D. Lee, formerly merchandise manager of laundry equipment, as manager of laundry equipment for the Westinghouse Electric Appliance Div., has been announced by R. J. Sargent, manager of major appliances.

G-E APPOINTS SPROULE

Thomas Sproule has been appointed manager - manufacturing of General Electric Co.'s Home Heating & Cooling Dept., according to S. J. Levine, department general manager.

Sproule was formerly manufacturing engineer in Schenectady, N. Y.

WE'VE MOVED!

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HUYCK CONSTRUCTION COMPANY

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PARK RIDGE, ILLINOIS

4 FEDDERS-QUIGAN DEPTS. MOVE TO LONG ISLAND

Fedders-Quigan Corp. will move four of its major departments in Buffalo to the company's head offices in Maspeth, L. I., it has been announced by Salvatore Giordano, president.

Slated for completion by Labor Day, the move involves the sales, advertising, engineering and finance units.

NORGE APPOINTS DONOVAN

Appointment of William J. Donovan as manager of freezer-food plan sales of Norge Div., Borg-Warner Corp., Chicago, has been announced by William C. Conley, director of product managers.

LAWNDALE ANNOUNCES UNQUALIFIED GUARANTEE ON PLUMBING WARE

Arthur M. Lander, president, Lawndale Enameling Co., Chicago, Ill.,

ARTHUR M. LANDER

manufacturers of a complete line of formed steel plumbing ware, has announced a new unqualified guarantee policy.

Lander said that the unqualified guarantee means that the company is standing 100% behind its products and will protect plumbers and contractors against loss from chipping, damage by workmen or other damage, up to the time of original label removal.

If any unit is damaged up to the time of original label removal, it can be returned to the jobber or dealer for replacement without charge. The jobber or dealer then returns the damaged article to the factory, and full credit is given.

ADMIRAL SALES DROP 12%

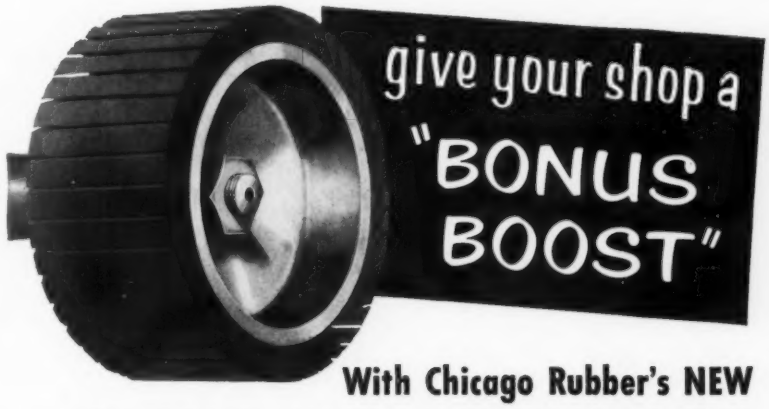
Admiral Corp. (Chicago) sales in the first quarter were approximately 12% lower than in 1954, announced Ross D. Siragusa, president.

BENGAL RANGE SALES DOUBLE IN FIRST QUARTER

A more than 100% increase in unit sales of Bengal gas ranges in the first quarter of 1955 was reported by Sol W. Weill, sales manager of the Floyd-Wells Co., Div., John Wood Co.

AMERICAN-STANDARD'S SUNBEAM DIVISION CHANGES NAME

The name of the Sunbeam Air Conditioner Div. of American Radiator & Standard Sanitary Corp. has been changed to the Air Conditioning Div. of American-Standard. There will be no changes in the policies or activities of the division.



With Chicago Rubber's NEW

COSMO EXPANDER WHEEL

You'll get faster grinding • Better work
Longer belt life • Easier trouble-free performance
Instant abrasive change • No down time

Cosmo Expanders up to 2" diameters available with ¼" mandrels for hand tools. Larger sizes up to 8" diameters—arbor hole type only. Specials to your specifications.

This brand new slotted rubber Cosmo Expander wheel cuts down high shop costs and valuable time. It's easier to operate and will allow you to get all the usable life out of your abrasive bands and sleeves. To change bands—no tools necessary. Slip it on and the centrifugal force exerted by this wheel holds the abrasive element tightly with no possibility of slipping—replacement becomes a matter of seconds. And what's most important, you will instantly notice a vast improvement in quality—the higher degree of resiliency in the Cosmo Expander will give you the best work you've ever done. You can't miss. Write for descriptive literature today.

"REMEMBER, IT'S THE WHEEL THAT DOES THE WORK"

CHICAGO RUBBER COMPANY, INC.

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MINNESOTA MINING DEVELOPING PORCELAIN ENAMEL FOR ALUMINUM

material available in pilot plant quantities for testing

Development work on a non-toxic, chemically resistant vitreous frit for porcelain enamel which can be fused to aluminum and its alloys was announced by Minnesota Mining and Manufacturing Co. at the dedication of its new research center near St. Paul, Minn., in May.

The new lead-free frit, now beginning to be field tested, is being developed as a decorative finish for aluminum. Contemplated uses include interior and exterior porcelain enamels used on building and decorating materials; household appliances; and finishes for airplanes, cars, ships and boats.

The report to *finish* states that initial field tests indicate that porcelain enamel made with the new frit is non-toxic; it will not flake or chip when cut or sawed; it retains its gloss under adverse weathering; it resists abrasion; protects against corrosion; can be sprayed or dipped; covers greater areas per pound than other enamels because of its lower density; and can be produced in a variety of colors.

The company said the material is available at present in pilot plant quantities for testing. More information may be had by writing Dept. 5-120, Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.

JORDON TO ESTABLISH NEW DIVISION

Jordon Refrigerator Co., Philadelphia, Pa., will establish a separate division to design, produce and sell its built-in refrigerator-freezer models, Harry Fogel, executive vice president, has announced.

BATTELLE INSTITUTE NAMES O'BANNON TECHNICAL ADVISOR

Loran S. O'Bannon has been named technical adviser at Battelle Institute, Columbus, Ohio. As a member of the staff of the office of the director, he will provide liaison between the Institute and its clients in industry.

WESTINGHOUSE COLUMBUS PLANT REPORTED NEAR CAPACITY PRODUCTION

In 1954, *finish* published a series of five articles in the May, June and July issues covering the then new Westinghouse refrigerator plant at Columbus, Ohio. At the time the articles were run, employment was approximately 1500. Today the plant has reached almost total capacity production and is now employing 5500 people.

C. L. VAN DERAU

Key figure in laying out the Columbus facility and planning its rapid increase in production is C. L. Van Derau, general works manager for three of the electric appliance division's four plants (Mansfield, Columbus and Newark, Ohio). He is also advisor on manufacturing for the division's fourth plant in Springfield, Mass.

WELBILT & DETROIT-MICHIGAN MERGE REPORTED

Welbilt Stove Co., Maspeth, L.I., N. Y., and Detroit-Michigan Stove

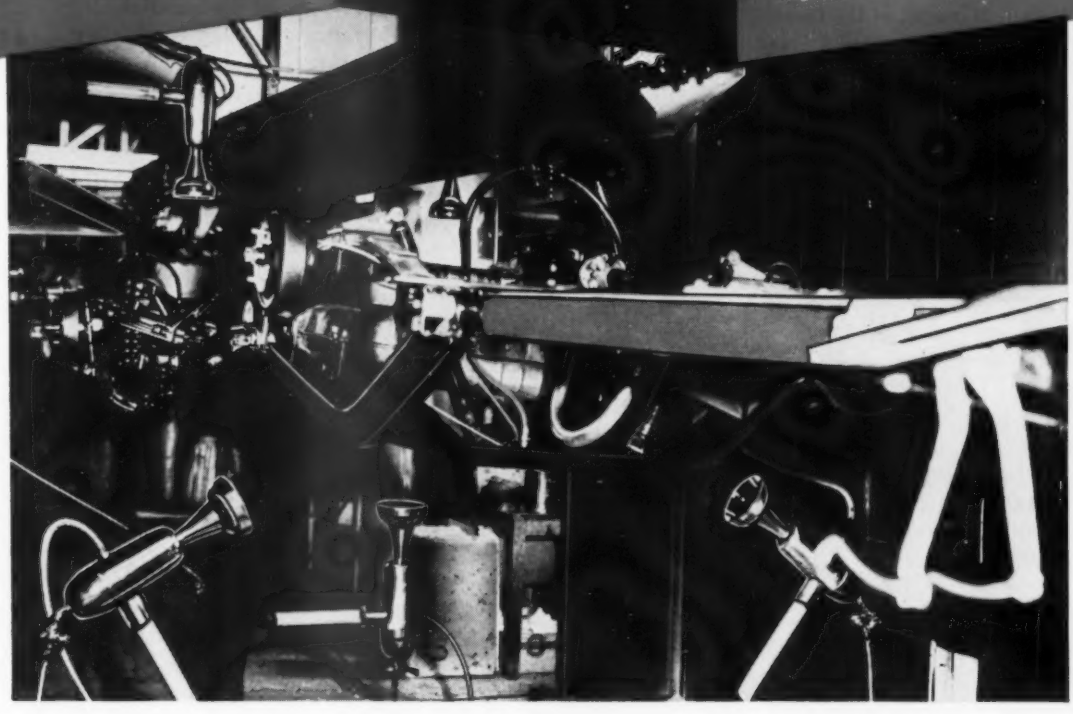
"Gone fishing" for sail *— Pictured here are Mr. and Mrs. Willard Johannsen (he is editor and publisher of Electrical Dealer), Miss Lorelli Lundry, on the National Business Publications, Inc. Washington staff, and Dana Chase, Jr., of* finish. *The fish, a six-foot sail, was caught by Miss Lundry off Boca Raton, Florida, when the foursome took time out for a short fishing trip while attending the NBP annual meeting in Boca Raton.*

9 TIMES MORE PAINT MILEAGE ON AUTOMOBILE CHASSIS!

STUDEBAKER

gets a better, more uniform, paint job on chassis as production is increased and finishing costs are cut substantially with

RANSBURG NO. 2 PROCESS Electrostatic Spray Painting*



● When Studebaker Division, Studebaker-Packard Corporation switched to Ransburg No. 2 Process of Electrostatic Spray painting on their automobile chassis, paint mileage was increased 9 times.

By simply putting the paint where it's supposed to go, Studebaker cut daily paint consumption on the chassis production line from 14½ drums to 1½ drums. And, still they are painting 6 more chassis per hour with the No. 2 Process.

In addition to getting better, more uniform coverage with the asphalt-type coating, paint and labor costs were cut 70¢ per chassis. In eliminating the former set-up with 2 water wash booths and 12 automatic spray guns, they save nearly 1000 square feet of badly needed floor space.

Another on-the-job-example of the unmatched efficiency of the Ransburg No. 2 Process in which quality of the work is improved . . . AT LESS COST!

* *Studebaker also uses the Ransburg method to apply a heavier and more uniform primer surfacer on automobile bodies.*

Whatever your product—large or small—if your production justifies conveyorized painting, it's possible that one of the Ransburg electrostatic processes can do the job better, with substantial savings to you. We'll be glad to tell you about complete Ransburg services.

Ransburg ELECTRO-COATING CORP.

Indianapolis 7, Indiana

RANSBURG

For further information about Electrostatic Painting Processes, write Dept. F

Co., Detroit, are reported to have reached a decision to merge the two companies. The merger was said to result in a name change to Welbilt Corp.

PEI mid-year meeting

→ *from Page 51*

the facing material in expansion and contraction.

William J. Marshall, of the Insulation Board Institute, covered a fiberboard type of material for possible use in the architectural building field. It was pointed out that this inexpensive material can be given a preservative treatment where necessary against fungus or termites.

L. A. Barron, of the Vermiculite Institute, described a mixture of Portland cement and "vermiculite" for which "no problem of durability in the architectural field has been found".

M. G. Jensen, of Owens-Corning Fiberglas Corp., presented some features of fiber glass materials which will not expand, are inorganic and non-corrosive, and are resilient without fracturing.

Enameling outlook

The meeting on May 11 was sponsored and conducted by the PEI General Enameling Division for those active in general enameling or jobbing work.

W. H. Lowry, Vitreous Steel Products Co., served as the chairman of the session and opened the meeting by presenting his "outlook" for future business in the field. He said that industry expects to do 5 to 15 per cent in 1955 over 1954 and that the general enameling section of the enameling industry cannot expect to ride along on the upswing of business without aggressive promotion and selling. "Sound advertising, promotion and sales will do the job," he stated.

N. W. Neice, California Metal Enameling Co., talked on the subject of "Diversification vs Specialization." He explained that, in most instances, West Coast enamelers were called on to do far greater number of jobs but in lesser quantities than are the Eastern enamelers. Operations on the West Coast, he said, are "geared to small orders." From 25 to 30 different varities of work are handled, including such items as table bases, water heater tanks, porcelain enameled aluminum, heat exchangers, combustion chambers, etc. "Porcelain enamel and ceramic coatings," he said, "offer a terrific future."

Porcelain enamel on aluminum

C. P. Lohman, Pemco Corp., lead a panel including R. F. Hafer, Reynolds Metals Co., and John R. Leary, Aluminum Company of America, on the subject of "The Outlook for Porcelain Enamel on Aluminum." Lohman indicated that the business was in its infancy with only about nine companies now doing porcelain enameling on aluminum. He pointed to the necessity for studying potential markets as well as for study in the materials and application processes. He raised such questions as, "Is the present aluminum alloy the best for the job? How long will it last? What kind of tests are needed?" etc. Lohman indicated that metal preparation remains an important consideration. A number of methods are now available but he pointed to the need for standardization.

Leary, of Alcoa, said that three specific groups must be thoroughly sold on the development: (1) the aluminum producers, (2) the enamelers and (3) the ultimate product buyer. Alcoa now has a team of four men working on the base metal, the frit, and application processes. One chief consideration in the study is cost. For example, work is being done on a new alloy which would be specifically for porcelain enameling. Alcoa is also looking for products and ideas for the use of porcelain enameled aluminum in fields other than architectural.

Hafer, of Reynolds, said his company is "exceedingly optimistic" for the future of porcelain enamel on aluminum. He does not believe that more than 500,000 pounds of aluminum has been used for this purpose to date but he pointed to the evidence of the producers' interest, exemplified by membership in the PEI by Alcoa and Reynolds and by Kaiser Metal Products. Hafer feels that porcelain enameled aluminum "will become a qualified engineering material." He referred to an upright freezer that is made entirely of aluminum, even to many of the compressor parts. It can be picked up and carried by one man. Reynolds also has a research project for evaluating the surface treatment, frits and the properties of the material.

Dean E. Sorensen, of Ernst & Ernst, public accountants, presented a comprehensive picture of the application of standard methods for cost determination.

New markets

In a discussion of "New Markets for the General Enameler," J. R. McCord, Ferro Corporation, pointed to seven requirements for progress by the enamelers: (1) creation of a favorable climate—the manufacturers have an educational job to do, (2) recognition of a basic need, (3) creation of the idea — the New Uses Committee of P.E.I. developed 101 new uses during an earlier study, (4) analysis of the market — new products should be developed so that business will not depend upon dividing up the existing market, (5) development of the idea with a prototype, (6) development of manufacturing techniques — enamelers should have adequate cost systems including provision for product research, development and promotion, (7) development of a merchandising program.

McCord feels that the present "quality market" in which the higher priced appliances and other products are selling readily is favorable to the enameling group.

Cold extrusion

→ *from Page 40*

from about 100 tons per square inch to over 200 tons per square inch.

Cold extrusion does not cost, it pays. It is a process for moving metal that makes removing it unnecessary. It uses only the minimum amount of steel necessary for the ultimate part. The elimination of scrap

Announcing...

A new heavy duty soak tank cleaner with maximum detergent power—

THE ALL-NEW PENNSALT CLEANER 36

For electro-plating and porcelain enameling cycles.

More Effective at 2/3rds Concentration Than Other Cleaners At Full Strength.

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losses also eliminates most of the machining costs. It may take some experimentation and tryout to achieve maximum benefits. Dies may be more costly but reasonable production quantities may erase the cost through the savings that accrue.

It is my prediction that while great strides have been made in the field of cold extrusion, much more will be accomplished within the next few years. The field is wide open for everyone in the metal stamping business.

Adapted for *finish* from a presentation before the 1955 Spring Technical Meeting of the Pressed Metal Institute.

New Westinghouse air conditioner plant

(Continued from Page 37)

ment and flow directly to the proper place on the general assembly line. The aluminum fin stock, .012-inch thick, is purchased in coils and processed into fins automatically. The specialized equipment for making the fins consists of a 30-ton punch press operating a two-station progressive die at 170 strokes per minute. This press is equipped with an adjustable automatic counter which cuts the fin stock, after it has been punched in the first station and the collars formed in the second station, to a predetermined length, depending upon the size of the evaporator being manufactured. Also arranged to operate through the necessary controls is an indexing table on which the cut fins fall. The height of the fin stacks are adjusted automatically, depending upon the particular evaporator requirements. The only attention required by the operator is to load the coil stock, adjust the counters for the proper length of fin and the proper number of fins per stack, and to remove the finished fin stack from the indexing table.

The copper tubes, cut to length and with one end belled, are then inserted into the stack of fins and evaporator supports, and the whole assembly is then jigged. The jig insures squareness and alignment while the other end of the copper tubes are belled by a suspended, portable air-operated expander.

The expander rods with special heads are mounted in a hydraulically operated carriage. The rods enter the tubes, expanding as they enter and expanding further to a total of about .014-inch on the withdrawal stroke. From 30 to 48 tubes can be expanded simultaneously. The evaporator then moves to the welding station where the return bends and headers are welded using double tip torches.

The return bends are manufactured on an automatic machine designed for this purpose. Two 20-foot lengths of straight copper tubing are placed over mandrels and the machine automatically advances, bends to the required shape, cuts off and ejects two bends at a time in a cycle of approximately six seconds.

After the evaporators are completely assembled and welded, they are immersed in a water tank and tested with 300 lbs. dry air in a set-up similar to the condenser immersion test equipment. After successfully passing this test, they are transported to the adjacent general assembly line at the point where they are to be used.

Electrical control assembly

To facilitate the complex wiring of the unit, the cables, switches, controls, and relays have been organized into sub-assemblies in a special area. Here the BX cable is cut to length with an abrasive cut-off, the electric wire is cut to length and skinned by machine.

Assembly is made of the required cables, panels are inserted into the proper capacitor or relay box, connectors assembled, motors wired, and the various connections made. These sub-assemblies are next given a circuit, continuity, and ground test and then placed on a special wheeled portable rack. The racks are moved across the aisle to the general assembly lines. Here the sub-assembly is taken from the rack, and only a few connections are required to install it in the air-conditioning unit.

General assembly lines

The general assembly lines run from south to north and are located in the central bays of the building. The sub-assemblies and parts required for these lines are fed from the side bays into the lines at the proper point of their assembly into the units. There are five separate conveyor lines arranged in the following manner:

Line one for the commercial self-contained 3, 5, and 7½ hp units, Model SU.

Line two for the residential 2, 3 and 5 hp units, Model RU.

Line three for the 10 and 15 hp commercial units, Model MU.

Line four for the 3 and 5 hp Heat Pumps, Model HP, and the 2 and 3 hp combination heating and cooling units, Model RG and RO.

Line five for the condensing units and compressors for field installation.

With the completed frame at the initial point on general assembly line, SU, RU, MU, HP, and RO, the compressor is assembled to the base, the condenser mounted in position, the evaporator inserted in position and the refrigerant cycle is then brazed in position. The unit is then advanced along the conveyor into controlled cycle dehydration ovens for the final dehydration of the refrigerant cycle. The unit is then advanced along the conveyor line where the electrical and control assemblies and insulation of the refrigerant cycle is added. Automatic charging stations then evacuate the units and put in accurately metered charges of refrigerant and oil.

Refrigerant handling system

Freon 12 and Freon 22 are purchased by the carload, each car containing fifteen 2000-pound containers. These are unloaded at the receiving end and placed in racks adjacent to the pumping equipment.

Each system consists of a double, thermostatically-controlled heated cradle, a diaphragm-type pump and a scavenger pump for reclaiming the residue in the 2000-pound containers, together with the necessary controls. From here the Freon is piped through copper tubing to the accumulators located next to the automatic charging stands. In the F-12 system, the Freon

Have paint dept. problems got you counting sheep?

SPEE-FLO HAS the ANSWERS

- Are rejects throwing your costs out of line?
- Are time and material costs eating up your profits?
- Are you getting consistent finishing room quality control?
- Are you satisfied with the appearance of your finished product?

Paint department headaches will disappear with Spee-Flo Hot Spray Heaters. Production costs will drop and consistent, all-weather quality control will be established.

We'll be glad to show you facts and figures on how other manufacturers in your field are producing better products at lower cost. Spee-Flo Hot Spray Heaters pay for themselves in the first few weeks of operation . . . they are long lived and trouble free.

LET US GIVE YOU AN ON THE JOB DEMONSTRATION

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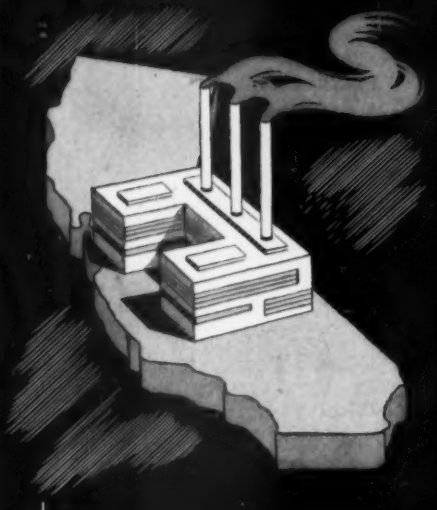
THE SPEE-FLO CO., Dept. 1x-5, 720 Polk Ave., Houston, Texas
Builders of practical industrial and automotive hot-spray equipment

Please send me information on your line of hot-spray heaters best suited to our work. Type of products being finished_____
Application is conveyorized____ turntable____ mobile____ other____
Average volume of material per gun per hour_____
Type of material_____ Please have representative call_____
Name_____
Company_____
Address_____
City_____ State_____

5-4B9

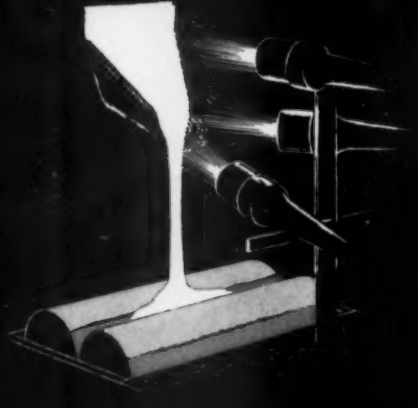
1920 FERRO 1955

A business grown big through SERVICE



1946 Ferro builds plant in California to better serve the growing west coast market.

1955 Ferro expands Los Angeles plant, adds two large continuous flake frit smelters.



FERRO CORPORATION

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IN CANADA: FERRO ENAMELS, LTD., OAKVILLE, ONT.

is pumped from the cradles at 125 pounds pressure to the accumulator and at 215 pounds from there to the charging stand. In the F-22 system, a pressure of 215 pounds is maintained in the line to the accumulator and 300 pounds from there to the charging stand.

Unit performance tests

Every unit goes through an air-conditioning performance test area. The capacity performance test requires that all units meet engineering specifications for performance output while operating under an air load of 80°F., dry bulb, plus or minus 1 degree F., and 67°F., wet bulb, plus or minus of 1 degree F. As an added requirement in order to standardize the conditions and put a more definite measure on the capacity range, the condenser water must be supplied at 80°F., plus or minus 1 degree F. at 65 pounds per square inch pressure. By maintaining air supplied to the units at standard conditions within 1 degree F. and controlling condenser water inlet temperature at 80° F. and 65 pounds per square inch pressure, specific requirements can be made for head pressure, suction pressure, water flow and temperature and power consumption.

The units are moved into test position and connected to the required electrical, water, and air supply. All switches, controls and cutouts are checked for proper operation and then the unit is run for one hour. Following this, readings are taken and checked for acceptance. Westinghouse believes that this test setup provides the most complete and fool-proof test a unit can receive.

The facilities required to perform this test include electrical power, 2000 kva, supplied at 4160 volts and distributed through automatic switching to 48 test positions. All voltages and phases are required. Two separate and complete air conditioning systems provide the heat load of conditioned air and condenser water for the units. The volume of air handled is in the order of 100,000 cfm. The units then receive a complete electronic detector test for possible leakage of refrigerant from the system.

Units are than advanced along the conveyor line where the unit is panelled, finally inspected and crated for shipment.

Material storage and shipping facilities

All incoming materials are received at the south end of the plant where four port-docks accommodate materials being received by truck and a rail siding. Four 50-foot cars may be unloaded simultaneously.

In the next three bays of the building, sheet steel for the panels and frames, the large diameter pipe for the condensers, the sheet aluminum and copper tubing for the evaporators, the rough compressor castings and the many small parts are received, inspected, and released to the manufacturing operations.

The unit is then transported to the warehousing area to await dispatch on customer order. The shipping facilities are similar to those for receiving. These are positions to load four 50-foot rail cars and four trailer trucks simultaneously.

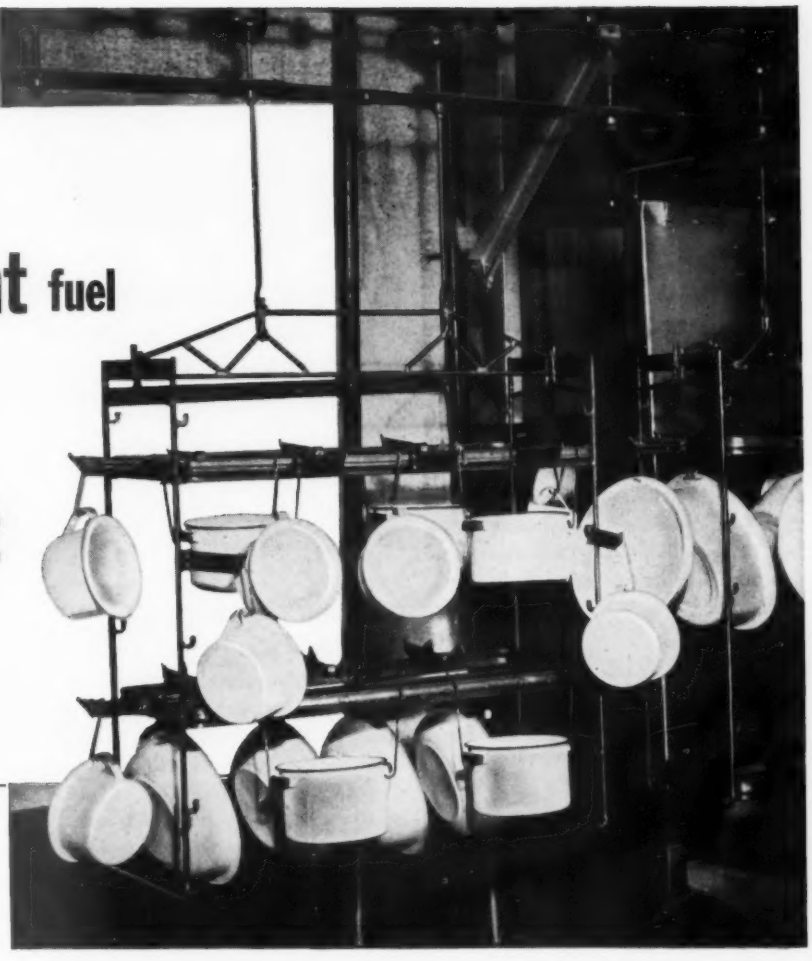
Quality control

The control of quality is of major importance throughout the entire operations, and the quality control program is based on the Westinghouse premise that "quality must be built into the product and cannot be inspected into the product." All incoming materials are inspected to precise specifications, and throughout the fabricating, machining and assembly of the product, rigid control is maintained.

First piece inspection is provided on all operations so that the operator is aware of the requirements on that particular job. The operator is provided with gauging equipment and drawings so that he can continuously check his work. Inspectors make patrol inspections as the jobs are run, at which time the operator's work is reviewed for compliance with requirements. Regular inspection to control all processes is also performed.

Even after the unit has been completed and crated for shipment, sample units are taken for quality audits and reviewed from the customers' standpoint. *Each size of unit is given a safe transit shipping test.*

Make heavy-weight fuel savings with light-weight Inconel burning tools



The more metal you bring up to enameling temperatures, the more fuel it takes.

That's why a good many plants now use Inconel® to reduce burning tool deadweight.

One large mid-western enameler, for example, saves approximately 37% on his fuel costs in this way. Originally he used 67 lb. fixtures to fire 63 lb. loads. With Inconel, 33 lb. fixtures do the trick.

Another concern, using double-deck hangers, has reduced weight of each from 31½ to 24 pounds (about 25%) . . . cut heating time and fuel costs accordingly.

Both manufacturers also point to product improvement and reduction in spoilage caused by falling scale. They also mention reduction in wear of conveyor parts.

Inconel makes light-weight burning tools possible because it retains high strength at enameling temperatures in sulfur-free atmospheres. It resists oxidation and scaling and requires little or no maintenance.

You'll find, too, that Inconel is easy to fabricate and weld. You're free to design for minimum section and maximum capacity.

If you would like to know more about making heavy-weight fuel savings with light-weight Inconel, write today for "Redesigning Burning Tools Cuts Costs."

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67 Wall Street New York 5, N. Y.

Inconel

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. . . for long life at high temperatures

NEWS ABOUT SUPPLIERS

TECUMSEH ABSORBS TRESCO

Tecumseh Products, Tecumseh, Mich., has absorbed Tresco, Inc. Tresco handles Tecumseh sales and engineering.

Ray Herrick, Tecumseh chairman, announced that Tresco's former owners, Curtis M. Brown, Jens K. Touborg, and Frank K. Smith, will be executive vice presidents, members of the board and active members of the executive committee.

T. W. Rundell, formerly of Servel, Inc., Evansville, Ind., will become general manager of sales and sales engineering.

CHICAGO VIT NAMES HOWE V P

Wm. Hogenson, president, Chicago Vitreous Corp., Cicero, Ill., has announced the election of E. E. Howe as vice president.

Howe joined the corporation in 1934 as a ceramic engineer and has served in various research and development capacities since. He will continue to serve as director of research.

LEUTWYLER SALES MANAGER OF HEINTZ MANUFACTURING

The appointment of John C. Leutwyler, Jr., as sales manager of Heintz Mfg. Co., Philadelphia, Pa., has been announced by J. Marcus Ward, executive vice president.

Leutwyler was formerly manager of the western sales division.

DEVILBISS APPOINTMENTS

DeVilbiss Co., Toledo, Ohio, has announced the appointments of Emil F. Frey, director of advertising and sales promotion, as manager of industrial sales; D. V. Perry, assistant sales manager, as manager of jobber sales; and Homer A. Lange, advertising manager, as manager of advertising and sales promotion.

DR. SONNICHSEN PERMACEL V P

Dr. Harold M. Sonnichsen, director of the technical division and a member of the board of directors, Permacel Tape Corp., New Brunswick, N. J., has been named a vice president, it was announced by the company.

TINNERMAN NAMES OVERSTREET PRES.; POTTER, SECY.-TREAS

Election of Robert C. Overstreet, formerly executive vice president, as president of Tinnerman Products, Inc., Cleveland, Ohio, has been announced by A. H. Tinnerman, chairman of the board.

John E. Potter, formerly comptroller, has been elected secretary and treasurer and a member of the board.

Overstreet succeeds George J. Schad, retired.

U. S. STEEL'S FAIRLESS RETIRES

Benjamin F. Fairless, chairman of the board and chief executive officer, United States Steel Corp., retired May 3, it has been announced by the corporation. He will continue in the capacity of director and a member of the finance committee.

Ferro Pioneer Club — *holds first annual dinner meeting at the Cleveland Athletic Club May 5. The Club was organized to give recognition to Ferro employees who have, or will this year complete, 25 years or more of service with the company. George Buerman, director of purchases, was the toastmaster for the event, giving personal notes on each of the 49 employees, representing 1400 years of service.*

R. C. MAHON

E. E. HOWE

R. C. OVERSTREET

WILBUR J. WALKOE

WALTER F. SHEETZ

F. T. ASTRELLA

R. C. MAHON ELECTS OFFICERS—MAHON CHAIRMAN; SHEETZ PRES.

At a meeting of the board of directors of The R. C. Mahon Co., Detroit, Mich., R. C. Mahon, founder and for 43 years president, was elected chairman of the board.

Walter F. Sheetz, executive vice president and sales manager, succeeds Mahon as president.

Other officers elected were Harry J. Lawther, Jr., secretary-treasurer; C. L. Chubbuck, first vice president; R. J. Kraemer, second vice president; Frank J. Romerscheim, Leston F. Chatfield, W. Henry Duffy, David J. Duggan and Wallace Herdlein, vice presidents.

1954 PEMCO'S 2ND BEST YEAR

Pemco Corp.'s (Baltimore, Md.) sales and profits for 1954 were second best in the corporation's history, exceeded only by 1950. As a result, engineers have been employed to survey the plant for further expansion of research laboratory facilities. It is also expected that additional smelting capacity may be required.

E. W. BLISS BUYS MACKINTOSH-HEMPHILL

Colonel J. S. Ervin, president, Mackintosh-Hemphill Co., announced that stockholders have approved the sale of the company's assets to the E. W. Bliss Co. Mackintosh-Hemphill, which becomes a division of Bliss, will continue to operate its plants in Pittsburgh and Midland, Pa.

PYRAMID KEY APPOINTMENTS

Wilbur J. Walkoe, formerly vice president and general manager, has been named president of Pyramid Mouldings, Inc., Chicago, Ill.

Prior to joining Pyramid in 1943, Walkoe was an account executive with Cruttenden & Eger Associates, advertising agency.

I. L. Reed, past president, has been named chairman of the board.

Frank T. Astrella, who was named vice president, will continue as general sales manager. He joined Pyramid in 1941 and was made sales manager in 1950.

PENNSALT MOVES OFFICES

Starting June 1, Pennsylvania Salt Mfg. Co.'s office address will be 3 Penn Center Plaza, Philadelphia 2, Pa.

NEW ROBERTSHAW-FULTON WEST COAST WAREHOUSE

A new warehouse to provide faster delivery service to West Coast customers has been opened by the Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Lynwood, Calif.

The warehouse carries a complete line of automobile thermostats and temperature controls for industrial applications.

YOUNGSTOWN SHEET & TUBE MILL

Construction of The Youngstown Sheet and Tube Co.'s new tin mill facilities at Indiana Harbor is underway. The production of the new mill will double the capacity of present electrolytic facilities.

NEW MONARCH ELECTS OFFICERS

New Monarch Machine and Stamping Co., Des Moines, Iowa, has announced the election of the following officers: W. H. Brenton, board chairman; O. L. Dykstra, president; L. A. Shelton, vice president and general manager; Neil T. Chadderdon, vice president, secretary and treasurer; and A. C. Anderson, assistant vice president.

BLACK APPOINTED AUTOMATIC SALES MANAGER

Appointment of William D. Black to the post of sales manager, Automatic, for the Automatic Transportation Co., Chicago, Ill., has been announced.

He succeeds George A. Hinckley, who has been promoted to general sales manager.

SLOAN TO COWLES BOARD

Edward W. Sloan, Jr., Cleveland industrial leader, has been elected to the board of directors of Cowles Chemical Co., Cleveland.

Sloan's election increases membership of the board from five to six, according to R. F. Huntley, president.

BERMINGHAM WESTERN SALES MANAGER FOR E. F. HOUGHTON

The appointment of John Bermingham, formerly sales representative, as the western sales manager for E. F. Houghton & Co., Philadelphia, Pa., has been announced by D. J. Richards, vice president of sales.

Bermingham succeeds W. A. Fletcher, deceased.

COOK OF BEHR-MANNING DIES

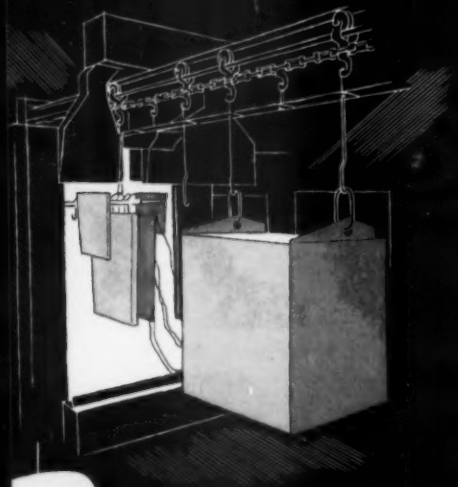
John M. Cook, vice president and general sales manager, Behr-Manning Div., Norton Co., and a director of both companies, died April 14 at his home in Johnsonville, N. Y.

WESTINGHOUSE FORMS DIRECTOR SYSTEMS DEPT.

The formation of a director systems department in Westinghouse Electric Corp., Pittsburgh, Pa., responsible for the engineering, manufacture and sale of specialized automatic control systems, has been an-

1920 FERRO 1955

A business grown big through SERVICE



1947

Ferro introduces a "Complete P.E. Production Check-up Service" built around famed "Bozsin Box" and quality-control techniques.

1955

Ferro's "Plant Survey" studies for Porcelain enamelers lead to lower production costs, bigger profits.

FERRO CORPORATION

leveland · nashville · los angeles

CANADA: FERRO ENAMELS, LTD., OAKVILLE, ONT.

nounced by J. K. Hodnette, vice president in charge of the apparatus products group.

ROBERTSHAW-FULTON APPOINTS CATHCART TO SPECIAL DUTIES

William F. Cathcart, Cleveland territorial manager of the Cooking Appliance Controls Div., Robertshaw-Fulton Controls Co., has been assigned to special engineering duties at the Robertshaw Thermostat Div., Youngwood, Pa.

Replacing him in Cleveland is D. Rex Scott.

M. & E. MFG. BUYS KELLOG DIV.

M. & E. Mfg. Co., Indianapolis, Ind., has bought the paint spray business of American Brake Shoe Co.'s Kellog division, Randolph Egener, M. & E. president, announced.

OHIO SEAMLESS APPOINTMENTS

Vice president, J. W. Kennedy, Jr., Ohio Seamless Tube Div., Copperweld Steel Co., Shelby, Ohio, has announced the following sales appointments: J. E. Horner, manager of sales; J. J. Arntz, assistant sales manager, and M. W. Freese, promotion and market development manager.

STEWART-WARNER'S HITER DIES

Frank A. Hiter, senior vice president, Stewart-Warner Corp. since 1944 and head of the Alemite and Instrument Div., died April 9 in Chicago.

VITRO'S LENCHNER RETIRES

Vitro Mfg. Co., Pittsburgh, Pa., has announced the retirement of Theodore Lenchner, according to Joseph Boyce, general manager. Lenchner served the company for over 30 years, as a vice president in 1951 and more recently as a consultant.

ACME STEEL DIRECTORS RE-ELECTED

Frederick M. Gillies, president, has reported that all directors of Acme Steel Co., Chicago, have been re-elected.

WAGNER BROS. NAMES JEROME

Steve Jerome has been appointed general manager of Wagner Brothers Equipment Co., Detroit, Mich., announced J. R. Wagner, president.

RYERSON NAMES FINDLAY

New manager of the Detroit steel service plant of Joseph T. Ryerson & Son, Inc., is William G. Findlay, it has been announced by Charles L. Hardy, president.

RANAN TO GREAT LAKES STMPG.

George Pinkus, president, Great Lakes Stamping & Mfg. Co., Toledo, Ohio, has announced the appointment of Benjamin Z. Ranan as general manager. Ranan was formerly associated with the Sonotone Corp., Elmsford, N. Y.

OLSTAD HEADS ENGR. FOR NIAGARA BLOWER

It is reported that Martin H. Olstad has been elected vice president, engineering, and William M. Mosler, secretary of the Niagara Blower Co., Buffalo, N. Y.

HILL LEAVES GAR WOOD

E. R. Leeder, executive vice president of Gar Wood Industries, Inc., Wayne, Mich., has announced the resignation of E. B. Hill, director of sales and advertising.

NEW RWMA MEMBERS

The Resistance Welder Manufacturers' Association has announced that Progressive Welder Co., Detroit, Mich., and United Welders, Inc., Bay City, Mich., have become members of that organization, increasing the membership to 13.

LAND HEADS PENNSALT DIVISION

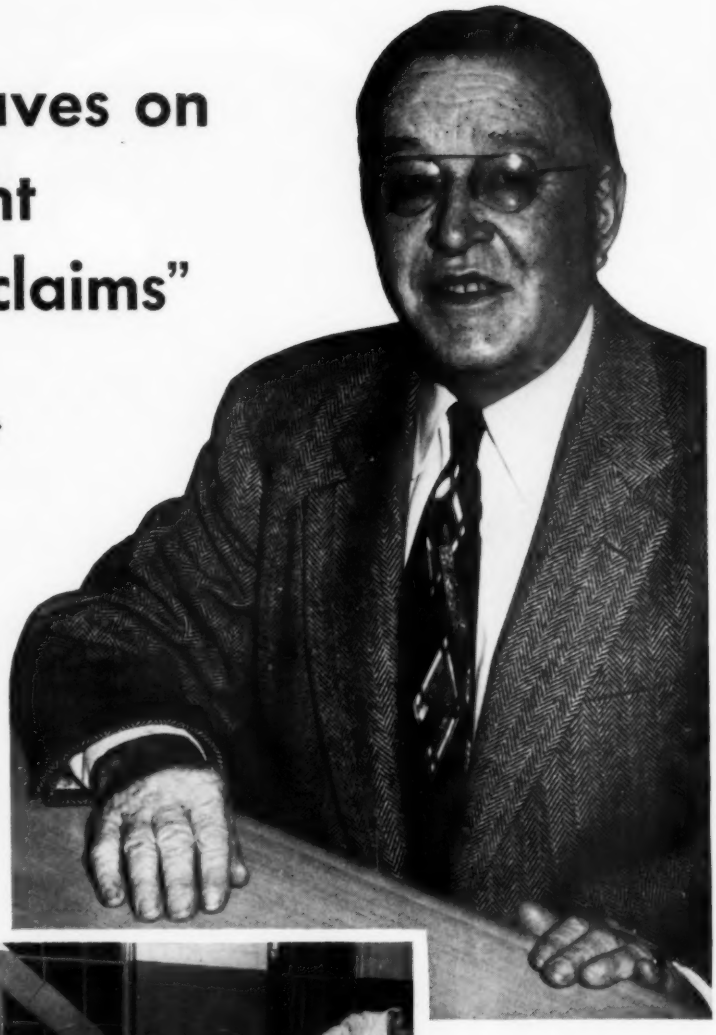
Hugh C. Land is succeeding William P. Drake as head of the Pennsylvania Salt Mfg. Co.'s Industrial Chemicals Div., Drake has announced.

Joining Pennsalt in 1946, Land has served as assistant to the production manager, production manager and manager of manufacturing.

sate transit

"Art Metal saves on assembly, freight and damage claims"

says Albin Johnson, Company Vice President



"— and we have a better container, since we began using Atlas Plywood's Ply-Fold crates for shipping Art Metal desks," Mr. Johnson reports.

"We particularly like the fact that Atlas Plywood Ply-Fold crates come to us partially assembled. That saves us valuable assembly time. We know, too, that these Ply-Fold crates keep our desks snug and undamaged in transit. This is a gain in convenience, economy, and efficiency.

"So you can say that our decision to investigate Atlas Plywood's lab-testing methods has given us substantial savings in everything that has to do with shipping our product."

Art Metal desks are built and finished with care — and Atlas Plywood's Ply-Fold crates "handle them with care." Desks feature smooth-sliding drawers, generous knee space, smart appointments . . . crates keep desks tight and shift-free in transit.

Safe and economical traveling is assured this Art Metal desk. The Ply-Fold crate protects all its smooth surfaces without expensive padding . . . it packs in cars without wasting space, is strong, durable, light . . . protects desk from bumps and jolts.

FREE Booklet!

New, illustrated 24-page booklet, "How Atlas Plywood Cuts Your Shipping Costs . . . Safely", may help you avoid needless product damage or too-high freight costs. Write — or see your Atlas Plywood representative (see yellow pages). Learn about the laboratory where Atlas Plywood containers win their lab-tested label. Atlas Plywood Corporation, Dept. F-10, 1432 Statler Bldg., Boston 16, Mass.

Atlas Plywood

CORPORATION

FROM AMERICAN FOREST TO FINISHED PRODUCT

PLYWOOD CONTAINERS • FLUSH DOORS • HARDWOOD PANELS

LAB TESTED ®

safe transit

A monthly trade publication section devoted to improved packaging and shipping and materials handling practices in the home appliance and metal products manufacturing field.

Plant experience information for all executives and plant men interested in the problem of packaging and shipping improvement and loss prevention.

Complete information on the National Safe Transit pre-shipment testing program for packaged finished products, and detailed progress reports of divisions and sub-committees of the National Safe Transit Committee.

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At National Packaging Exposition *— more than 400 different companies had exhibits covering a total of three acres. Shown above is booth of Gaylord Container Corporation. Sponsored by the American Management Association, the show was held at the International Amphitheatre, Chicago, April 18-21.* *(For a report on the Exposition and concurrent Packaging Conference turn to Page ST-5.)*

Inspected and Crated *— a new Westinghouse air conditioning unit is on its way to keep some business establishment or residence cool. It is being shipped from the company's new plant in Staunton, Virgina, which has facilities for loading four railroad cars simultaneously entirely within the plant. There are also port docks to accommodate four trailer trucks.* *(For a description of production operations at this new plant, turn to Page 29.)*

CUSTOM DESIGNED

HEAVY-DUTY SHIPPING CONTAINERS FOR

The lift truck inserts the lifting flange under one side of cap and pulls up. The strong construction enables sure, fast lifting and close stacking without usual jostling.

MAGIC CHEF
HOME HEATERS

International packaging specialists designed a new efficient shipping container for Magic Chef, using their tube and cap construction. Here are its outstanding advantages:

1. *Easier handling.* A lift truck approaches the container from any side and lifts from one to four at a time and places them in a stack without jostling due to cap construction. (See drawing.)
2. Stacks seven high without pallets.
3. Customer receives range factory fresh because of dustproof construction.
4. Eliminates uncrating hazards — no wooden skids — no nails. You need no hammers or pinch-bars.
5. Large clean surfaces give ample room for identification of contents and for advertising.
6. This custom designed heavy-duty shipping container is approved by the Consolidated and Uniform Freight Classification Committee for rail shipment.

International Paper company
CONTAINER DIVISION
220 East 42nd Street, New York 17, N. Y.

Hold record packaging show in Chicago

more than 31,000 persons attend American Management Association's packaging exposition — 1,000 attend packaging conference

MORE than 31,000 visitors attended the 24th National Packaging Exposition held at the International Amphitheatre in Chicago, April 18-21, making the 1955 show the largest in packaging history.

The largest previous attendance total was chalked up two years ago when 27,700 packaging men attended the 1953 show, also held in Chicago, at the Navy Pier.

Registration at the concurrent National Packaging Conference, held at the Palmer House, totaled more than 1000. The three-day program presented 50 speakers in a review of virtually every aspect of industrial and consumer goods packaging.

Following are reports on a few of the addresses which touched on matters of interest to appliance and other metal product manufacturers.

Protecting porcelain washer tops with W-shaped pads

C. J. Phiscator, packaging engineer for Whirlpool Corporation, St. Joseph, Michigan, described how they developed their current packaging techniques, many of which were covered pictorially in his article in August 1953 *finish*, entitled "*Pressure Packing Automatic Washers.*"

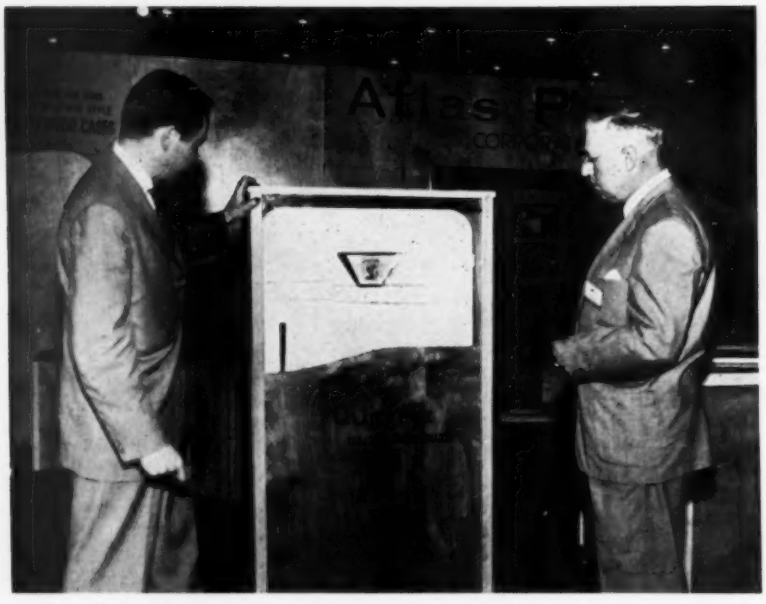
A very important innovation mentioned by Phiscator was one they recently developed to combat damage to porcelain tops on laundry appli-

C. J. PHISCATOR
WHIRLPOOL

PAUL O. VOGT
GENERAL ELECTRIC

FRANK J. MILLER
U. S. RADIATOR

Permacel's booth was highlighted by a display of tapes in various colors. Sharon Raye was on hand to explain the merits of the new cloth tapes.



Don R. Wall (left), of Atlas Plywood, explains features of new-type Ply-fold box with metal corner strips stitched to the crate sides.

finishfotos

Art Gnaedinger, Dennis J. Mollahan and William Webster are shown with an International Paper shipping container for Rheem furnaces.

ances. Whirlpool had used a simple built-up top pad with creped cellulose facing for protection of the baked enamel top previously used. But when they switched to porcelain enamel tops, considerable damage of the chipping variety was encountered when, in stacking, a great deal of weight was transmitted through the top pad to the appliance top.

"This was our worst problem up to this point," said Phiscator, "and I believe we finally have it whipped by way of a special top pad which looks like a capital 'W' — that is, the two outer legs of the 'W' rest against the side of the carton and extend from the top down to the machine top level. They have a horizontal panel 6″ wide, covered with cellulose wadding, resting on the machine top. The middle legs then come up at an angle to the top of the carton and meet with a center panel, which holds the carton flaps. During sealing, this pad gives an almost perfect glue sealing job. Also, in stacking, the W-sheet will collapse before chipping the porcelain top."

Redesign of hot water boilers simplifies crating operations

Frank J. Miller, supervising engineer of U. S. Radiator Corp., Detroit, described the development of a cast iron gas-fired hot water boiler into a packaged unit. Previously, a shipment consisted of five separate units to be packed and handled — the assembled sections, the base, a box containing miscellaneous fittings, a carton housing the draft diverter, and a crate with the metal jacket casing.

"Our plant experienced considerable difficulty controlling this system of packing . . . and in view of continued shortage claims and pressure from the field to reduce lengthy and costly assembly time, we began to explore the possibility of shipping assembled units," said Miller.

Through work on the drawing board and in the laboratory, U.S. Radiator redesigned the boiler, which is used for residential and small commercial buildings. Today the sequence of operations on the final assembly line finds the boiler and its wirebound shipping crate being as-

sembled simultaneously as one complete unit.

Production up 100% manufacturing costs down 8%

Miller stated that the combination assembly and packing line is repetitive enough so that it now gives their employees an opportunity of increasing their earnings through an incentive plan, and also increased production about 100%.

"As opposed to the paper snowstorm of 61 packing sheets that we originally used in an attempt to eliminate errors, we now require only 17 much more simple forms. . . . The overall manufacturing cost of the boiler was reduced by approximately 8%, and though there is more labor involved in the assembly operation, we are able to market this packaged unit at the same price as the model which it replaces, and still show an increase in profit!" concluded Miller.

G-E's testing laboratory

A never-ending search for the most effective and economic package has led General Electric Co. to establish in its manufacturing services division, a company-wide activity, a package research, development and testing laboratory. (In addition, G-E maintains small packaging laboratories in various departments of the company.)

Details of this 8000 sq. ft. laboratory were discussed by Paul O. Vogt, consultant, packaging, warehousing and shipping, General Electric Co., Schenectady, N.Y.

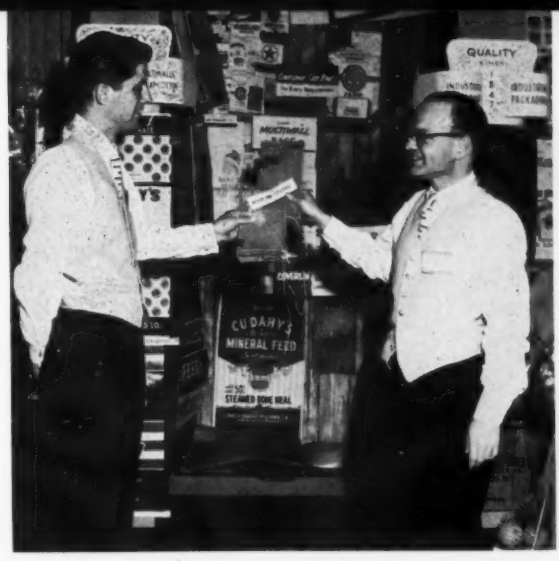
An area of 5000 sq. ft. is devoted to package design in paper, plus research in fibres, glues, plastics and materials for cushioning. Also included in this area is package testing equipment.

The other 3000 sq. ft. is devoted to package research and development in wood, including wirebound boxes, pallets, blocking and bracing, and dimensioned wooden boxes.

Basic areas in packaging tests

Vogt mentioned two basic areas for testing of packaging materials — one is the material itself and the other is the resistance of that material in the

to Page ST-10 →



Shown with a bomb cap cover made from water-proof kraft paper are Donald Ruch and Wendell Newman, of Chase Bag.

C. C. Bush and C. W. Ackley, of General Box, show off their wirebound container used for shipping the newly-styled Permaglas water heater.

finishfotos

At Acme Steel's booth, R. M. Snodell demonstrates their high-speed production line strapping machine.

THE BOX SETS THE STAGE...

Gaylord Boxes

. . . when you raise the curtain on a new product. A modern container dramatizes the features of your product. Yet, the cost of a fresh design for your box is just a small fraction of what you spend on product development.

Strikingly handsome printed effects are now made possible by Gaylord's newly-developed "Oyster White" boxboard. For samples and complete information, call your nearby Gaylord office.

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT PAPER AND SPECIALTIES • KRAFT BAGS AND SACKS

GAYLORD CONTAINER CORPORATION ★ ST. LOUIS

SALES OFFICES FROM COAST TO COAST ★ CONSULT YOUR LOCAL PHONE BOOK

ST-8

SIGNODE Strapping Station Handles Interlocking Flange Containers—2 a Minute

Here is high-speed, conveyorized production line packaging equipment that enables two men to fold, hold and strap *two* complete interlocking flange containers per minute . . . 120 an hour!

S-75 handles containers up to 41" x 50"

This conveyorized strapping station can handle containers ranging in width from 18" to 41" . . . and in length from 18" to 50". Adjustment for width is made in a matter of seconds. Adjustment for length is provided automatically by a set of five spring-loaded stops.

Offers new ways to cut costs

The S-75 Strapping Station breaks the bottleneck that formerly restricted the use of interlocking flange containers, and the savings in strapping time, strap used, manpower and handling time alone will quickly pay for this low-cost, profitable conveyorized strapping installation. For complete information write:

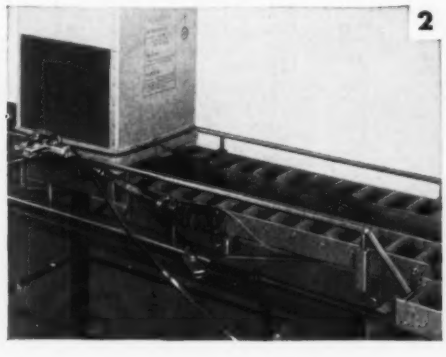
SIGNODE
STEEL STRAPPING COMPANY
2639 N. Western Ave., Chicago 47, Ill.

THIS SEAL MEANS SIGNODE SECURITY IN SHIPPING

In Canada: Canadian Steel Strapping Co., Ltd., Montreal, Toronto
Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide

(1 & 2) Rails hold folded side flaps. The forward stop (photo #1) holds front flap. Spring-loaded stops (photo #2) rise automatically as container passes over them to hold rear flap. Steel strapping is passed around the container, and is tensioned and sealed by a Signode seal-feed strapping machine. A special tool mount and balance arm hold the machine at the right level for strapping. When the machine is depressed it is disengaged and the front stop is released, so the container can move on down the line to the next position.

(3) Top cap is folded and held in position by a simple jig. Strapping tool, suspended from a spring balancer, tensions and seals the draped strapping.



→ *from Page ST-7*

form of containers and filler pieces to withstand the hazards of warehousing and transportation.

"The *material evaluation area*, which is our means for measuring the quality of packing materials currently in use, consists of puncture, crush, thickness and weight, tear and burst testers," said Vogt, adding, "In our opinion the puncture tester is the best measurer of the quality of corrugated board."

In the *shipping container evaluation area*, Vogt mentioned that G-E uses three tests, namely: compression, vibration and impact. The compression test is used to measure a container's ability to protect its contents against the crushing forces occurring during warehousing, handling and transportation. The ability of a container to protect its contents againsts vibration occurring during transportation is measured on a vibration tester.

The third and most severe test a container is subjected to is the impact test, which G-E also uses for testing palletized and multiple loads, concluded Vogt.

REGIONAL MEETING HELD AT NST LABORATORY

THE first of a series of projected regional National Safe Transit meetings was held April 14, at the laboratory of Canton Corrugated Box Co., Canton, Ohio. Host at the meeting was Paul Vandervort, vice president and general manager of the company whose Safe Transit laboratory served as a backdrop for the educational program for the benefit of representatives from near-by manufacturing companies.

Explanation of the National Safe Transit Program, a showing of NST films and a laboratory demonstration were presented by Paul Bush, chairman of the NST Technical Division.

M. A. Phren, representing Railway Express Agency, described the "two-way street," involving both manufacturers and carriers. He said in part, " . . . If a manufacturer cares enough to pre-test his *packaged product* and uses the National Safe Transit label, it proclaims that he is doing everything possible to live up to his obligations outlined in the National Safe Transit program. In such cases, we will exercise every possible care and precaution with those packages that bear the label on the basis of the 'two-way street' — if the manufacturers do their part, we, as a carrier, will do our part."

He further pointed out what the label means to Railway Express in that they are using the NST program and the importance of the label in their educational program covering 23,000 offices and to all employees so that each has an understanding of the program and the label.

Phren further pointed out that any town that has more than ten employees has a loss and damage committee composed of men on the job and a chairman being one of the members who is an actual worker. They hold periodic employee group meetings and the NST program as a whole is stressed to them. He assured the shippers attending the meeting that they could expect the continued support and cooperation of Railway Express in the furtherance of the NST program.

Following the formal program, there was a question and answer period and then a demonstration of NST tests in the laboratory.

It is indicated that a number of manufacturers in attendance who are not now certified are planning to take the necessary steps to join the ever-increasing list of certified companies.

THREE CLASSIFICATIONS FOR SAFE TRANSIT LABORATORIES

The National Safe Transit Comittee has just announced a new breakdown of certified Safe Transit Laboratories according to the following classifications: (1) independent testing laboratories, (2) container testing laboratories, and (3) special testing laboratories.

Independent laboratories

Container Laboratories, Inc.
New York City, New York
Container Laboratories, Inc.
Chicago, Illinois
The Don L. Quinn Company
Chicago, Illinois
U. S. Testing Company, Inc.
Hoboken, New Jersey

Container laboratories

Atlas Plywood Corporation
Lawrence, Massachusetts
Bigelow-Garvey Lumber Company
Chicago, Illinois
Canton Corrugated Box Company
Canton, Ohio
Chicago Mill and Lumber Company
Chicago, Illinois
Container Corporation of America
Chicago, Illinois
Cozier Container Corporation
Cleveland, Ohio
Dura-Crates, Inc.
Indianapolis, Indiana
Flintkote Company
Los Angeles, California
Fort Wayne Corrugated Paper Company
Fort Wayne, Indiana
General Box Company
Des Plaines, Illinois
Highland Box Company
Highland, Illinois
The Hinde & Dauch Paper Company
Sandusky, Ohio
Indianapolis Wire Bound Box Co.
Indianapolis, Indiana
Inland Container Corporation
Indianapolis, Indiana
International Paper Company
Chicago, Illinois
International Paper Company
Georgetown, South Carolina
International Paper Company
Los Angeles, California
International Paper Company
St. Louis, Missouri
International Paper Company
Whippany, New Jersey
International Paper Company
Wooster, Ohio
Love Box Company
Wichita, Kansas
The Mengel Company
Louisville, Kentucky
The Mengel Company
New Brunswick, New Jersey
The Mengel Company
Fulton, New York
The Mengel Company
Winston-Salem, North Carolina
The Nashville Corrugated Box Co.
Division of The Mengel Co.
Nashville, Tennessee
Northwestern Corrugated Box Company
Minneapolis, Minnesota
Ohio Boxboard Company
Rittman, Ohio
Package Research Laboratory
Rockaway, New Jersey
Packaging Service Company
Willow Grove, Pennsylvania
Rathborne, Hair and Ridgway Box Co.
Chicago, Illinois
Twin Cities Container Corporation
Coloma, Michigan
Union Bag & Paper Corporation
Savannah, Georgia
The Weston Paper & Manufacturing Co.
Terre Haute, Indiana

Special laboratories

American Gas Associations Labs.
Los Angeles, California
L.A.B. Corporation
Skaneateles, New York

Wirebound
Nailed or Hinge Corner
Cleated Plywood
Cleated Craveneer
Cleated Corrugated
Watkins Type Containers
Shop and Tote Boxes
Woodsteel Nesting Boxes

★

FOR DOMESTIC OR EXPORT
FOR PEACE OR DEFENSE

A shipping container for every shipping purpose

Sending your crated product through the Chicago Mill and Lumber Company Laboratory is like taking out an insurance policy for safe delivery.

Experienced engineers and crate designers use the latest in testing equipment in search for weakness that may result in transit damage to your valuable finished products. Assurance of safe arrival will result from pre-shipment testing in our National Safe Transit certified laboratory. Avail yourself of this service.

FOR SAFER TRANSIT BY • TRUCK • BOAT • TRAIN • PLANE

CHICAGO MILL AND LUMBER COMPANY

33 South Clark Street — Chicago 3, Illinois

Plants at: Helena, Arkansas • Greenville, Mississippi • Rockmart, Georgia
Tallulah, Louisiana • South Fork, Colorado • Chicago, Illinois

SAFE TRANSIT NEWS

NATIONAL SAFE TRANSIT COMMITTEE

Associations Building, 1145 - 19th St., N. W., Washington 6, D. C.

Leading Television Manufacturer Certified - Newly certified under the National Safe Transit Program is Sylvania Electric Products, Inc., Radio and Television Division, Buffalo, New York. The company has its own fully equipped Safe Transit laboratory.

- - - - -

Fresh'nd-Aire Company Certified - Fresh'nd-Aire Company, Division of Cory Corporation, is another leading manufacturer recently certified. The company, which manufactures room air conditioners, fans and dehumidifiers, is using the testing facilities of a Safe Transit laboratory.

- - - - -

Safe Transit Laboratories Now Total 40 - Latest laboratory certifications are Northwestern Corrugated Box Company, Minneapolis, Minn., and Flintkote Company, Container Division, Los Angeles, California.

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Conference Features NST Program - The spring meeting of the Northeastern Motor Carrier Claim Conference, held on May 6 in Philadelphia, Pa., featured an hour and a half presentation of the National Safe Transit Program. Guest speaker was R. F. Bisbee, General Chairman, National Safe Transit Committee.

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Safe Transit Approved Equipment - A listing of sources for Safe Transit approved equipment and instruments, and descriptive literature supplied by the manufacturers may be obtained by writing the National Safe Transit Committee, 1145 Nineteenth Street, N. W., Washington 6, D. C. Independent evaluating agency for instruments approved under the NST Program is United States Testing Company.

- - - - -

Frequency of Testing - The NST Committee continues to stress the importance of frequency of testing in order to derive maximum benefits through participation in the National Safe Transit Program. Variables in material, material substitution, and variation in workmanship occurring each day point up the need for establishing a regular and frequent testing program whenever possible.

- - - - -

General Chairman Visits New NST Offices - General Chairman R. F. Bisbee visited the Committee's headquarters office in Washington, D. C. on May 4. Mr. Bisbee and John C. Oliver, Secretary, spent the day reviewing Safe Transit projects and laying plans for future activities.

- - - - -

NST Color-Sound Film - The Committee's 16mm, color-sound film on the National Safe Transit Program continues to be shown to wide and varied audiences. Among the sponsors of recent showings were Stromberg-Carlson Company, International Business Machines Corp., Miami Valley Traffic Club, Dayton, Ohio, and U. S. Naval Ammunition Depot Earle, Red Bank, New Jersey.

- - - - -

Office Machine Manufacturers - In the past six months a number of the larger producers of office machine equipment have had the pre-shipment testing program under study. Commented one manufacturer, "General opinions were to the effect that this pre-shipment testing program is an excellent thing and that we should have a packaging laboratory so that we can start on the program immediately". Already certified under the Program is Royal Typewriter Co., Inc.

- - - - -

Conbur Machines Calibration - The NST Technical Division, under the chairmanship of P. W. Bush, is gathering material for a technical paper on Conbur Machines Calibration.

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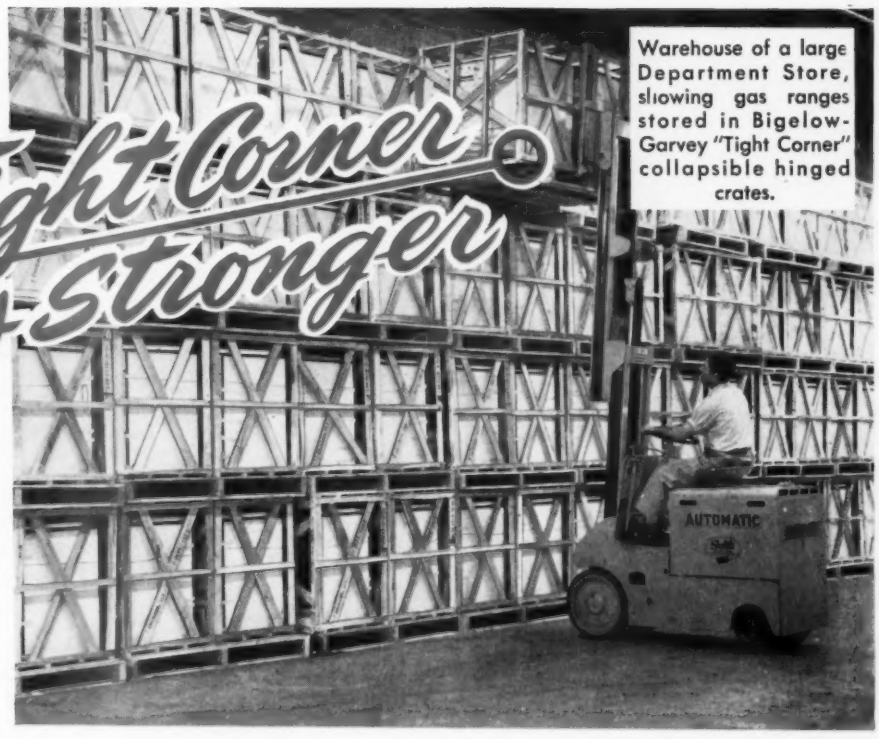
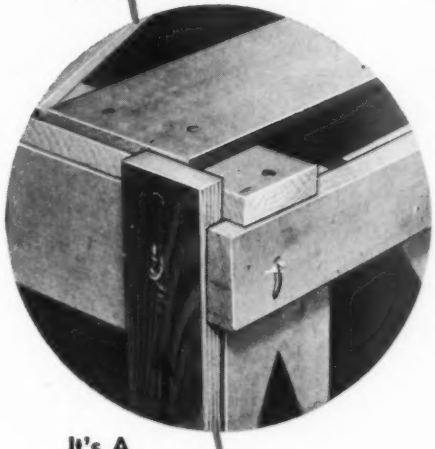
The B G Tight Corner is Stronger



Warehouse of a large Department Store, showing gas ranges stored in Bigelow-Garvey "Tight Corner" collapsible hinged crates.

NOTE CORNER LOCKING FEATURE



It's A B G EXCLUSIVE

B-G Tight Corner Collapsible Hinge gives all Bigelow-Garvey Crates and Pallet Boxes that extra strength and rigidity to withstand normal handling and transit hazards.

B-G Containers are pre-tested and meet national safe-transit specifications.

B-G Tight Corner Hinged Crates and Boxes are engineered to your particular requirements and give extra assurance of the safe delivery of your product.

B-G Containers are engineered for strength and lightness. Nail holes are pre-drilled for quick assembly of the three component parts—top, bottom, and collapsible side walls.

B-G Tight Corner Collapsible Hinged Containers and Pallet Boxes are Profit Items for you in your shipping and handling program, when you consider the safety of your product, the time saved and the steadily rising labor costs.

Whether for defense or civilian products, let Bigelow-Garvey's 30 years of packaging engineering experience be the solution of your storing, shipping, and materials handling problems.

B-G K-D Crates are Palletized for fork lift handling

Tight Corner Hinge Crate · Wooden Pallets · Model A Pallet Boxes · Model B Pallet Boxes · Model C Pallet Boxes · Kraft Crate · Wooden Boxes · Six Section Panel Crates

MILLS: ARKANSAS GEORGIA WISCONSIN MINNESOTA ILLINOIS

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Write for complete details and prices to...

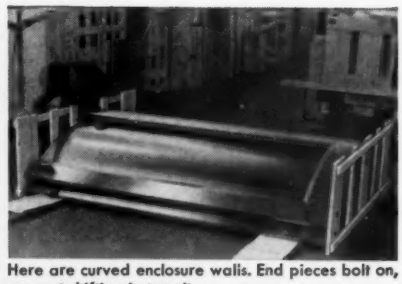
BIGELOW-GARVEY lumber company

WHitehall 4-5252

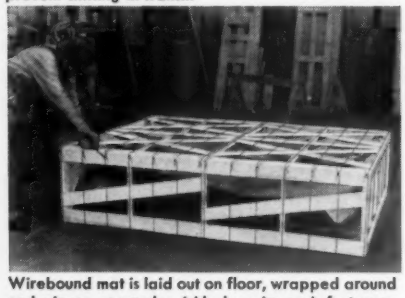
General Office and Laboratory

320 W. HURON STREET • CHICAGO 10, ILLINOIS

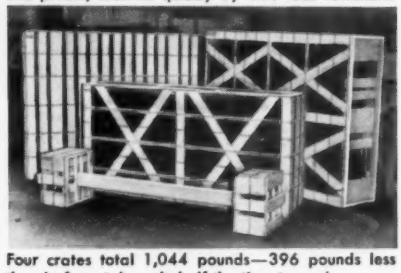
One of four General Wirebounds, this one, containing two 100-pound glazed door wings, is ready for shipment from the Evansville, Indiana, plant of International Steel, largest revolving door maker.



Here are curved enclosure walls. End pieces bolt on, prevent shifting in transit.



Wirebound mat is laid out on floor, wrapped around end pieces, secured quickly by wire rock fasteners.



Four crates total 1,044 pounds—396 pounds less than before, take only half the time to pack.

Revolving door costs turned sharply down by General-Engineered Wirebounds

Shipping a revolving door means packing heavy, costly precision parts—a round ceiling piece, curved enclosing wall, glazed door wings, and an eight-foot shaft with large bearings at each end.

International Steel Co., Evansville, Indiana—the leading manufacturer of revolving doors—ships many per year, is keenly cost conscious. General Box engineers, working with International's Manager of Shipping, recently came up with wirebounds that cut shipping weight by 396 pounds and cut packing time in half, compared with the custom-built nailed crates formerly used.

Total savings from use of the new containers are expected to amount to at least $10,000 a year. As International's management is well aware, it would take a lot of sales to boost profits that much.

General has the testing facilities and the experience to help your company make this kind of progress, too. And it costs nothing to find out what the possibilities are. Just let us know where you are and what you ship. We'll send a man. And ask for your free copy of illustrated booklet, "The General Box."

Factories: Cincinnati; Denville, N. J.; East St. Louis; Detroit; Kansas City; Louisville; Milwaukee; Sheboygan; Winchendon, Mass.; General Box Company of Mississippi, Meridian, Miss.; Continental Box Company, Inc., Houston.

Engineered Containers for Every Shipping Need

• Wirebound Crates and Boxes • Generalift Pallet Boxes • Corrugated Fiber Boxes • Cleated Corrugated and Watkins-Type Boxes • Stitched Panel Crates • All-bound Boxes

General Box

1823 Miner Street, Des Plaines, Ill.

★ ★ ★ ★ ★

How bathtubs for mobile homes are cushioned in wrap-around crates

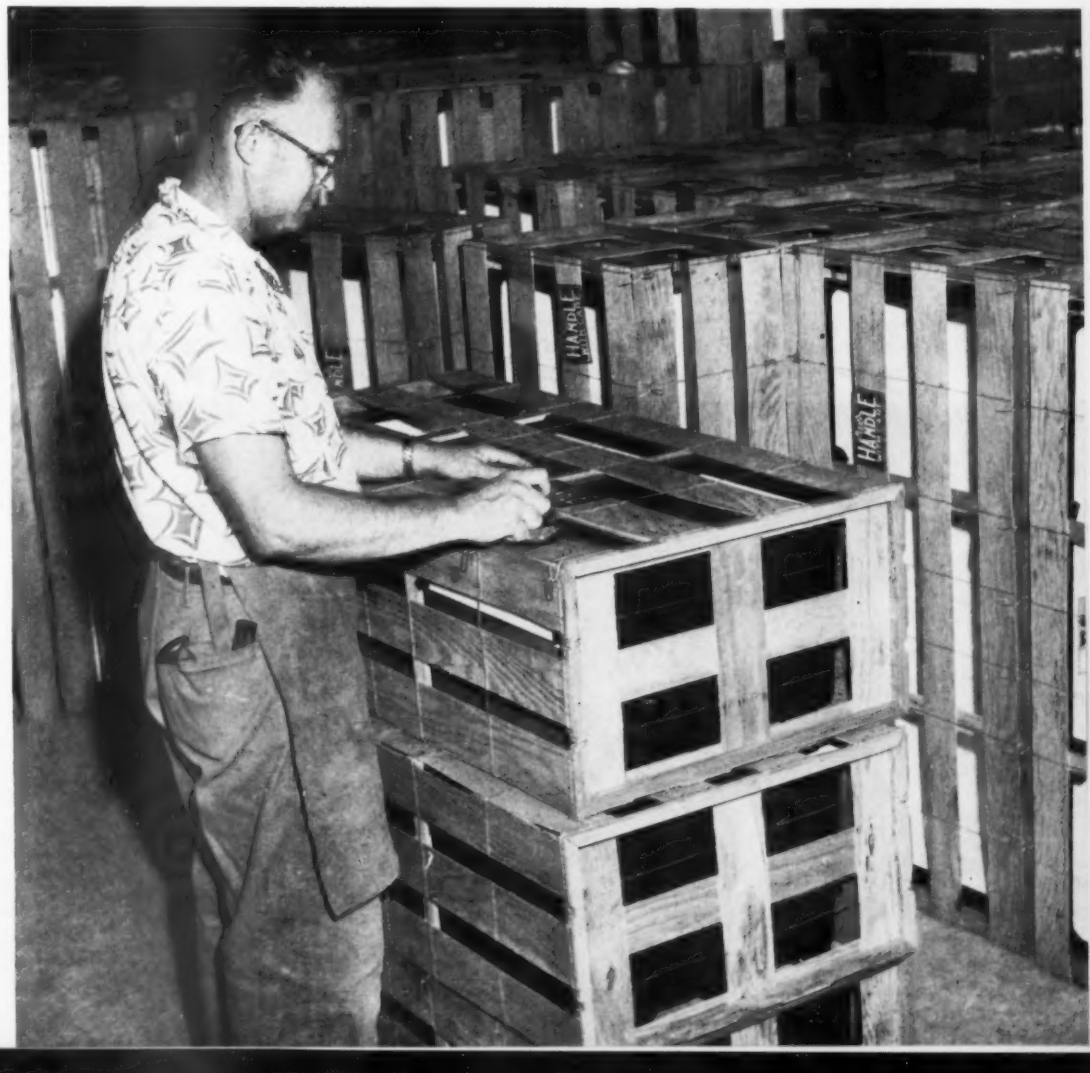
each bathtub is packed in about four man-minutes, including stapling cushioning pads

THE U. S. Porcelain Enamel Co., Los Angeles, is one of the largest firms in its field on the West Coast, and well knows the hazards involved in shipping porcelain enameled ware long distances. It has an enviable record of effective packing for safe shipment of its products.

Enameled steel bathtubs for automobile trailers — now known as mobile homes — constitute a part of the company's over-all production. The tubs are made in two sizes and eight models for the currently booming mobile home industry, as well as for installation in existing mobile homes.

The bathtubs weigh 98 pounds each and require thorough protection against possible damage due to shipping and handling shocks and jars while enroute from the Los Angeles factory to destinations throughout the country. They are shipped in carloads, truck loads, and less than full loads.

R. G. Lundeen, representative of U. S. Porcelain, states that the crates used by the company to pack bathtubs for shipment effectively prevent hid-



Another porcelain enameled steel bathtub, for the mobile home industry, is ready for shipment from the plant of U.S. Porcelain Enamel Co., Los Angeles.

1. *Pads of protective cushioning material are stapled to strategic points of cleats of four-section, wrap-around crate blank.*

2. *A 98-pound bathtub is placed upon one section of crate to be "wrapped up" for shipment from plant of U.S. Porcelain Enamel.*

den damage, keep over-all shipping damage insignificant, and provide pronounced packing room economies since crates are assembled during the packing process itself.

Protective cushioning pads stapled to crate cleats

To pack a bathtub for shipment, a one-piece wirebound blank that comprises the four sides of the crate is laid on the floor or atop a previously packed tub. The tub is placed on one section of the crate blank after protective cushioning pads have been stapled to the cleats of the blank at strategic points. One side of each of the crate ends is then attached to one section of the blank, and the latter is "wrapped around" the tub so that only the front side still is open.

Cartoned accessories and fittings are placed in front of the tub, a piece of pre-cut wooden blocking is slipped between the end of the crate and the end of the tub, and the crate is closed simply by folding shut the open side, securing the other sides of the wirebound ends to it, and engaging and closing wire-loop fasteners.

In all, only four-man minutes are needed to pack a tub, including stapling the cushioning pads. Crates are packed one atop another to three-high from the floor, then are taken to the shipping room.

The company reports that over-all packing-for-shipment costs are kept low by the speedy "wrapping up" process and the elimination of heavy or complicated special interior packing or bracking. Only a few seconds are needed to staple the cushioning pads to the cleats of the crate.

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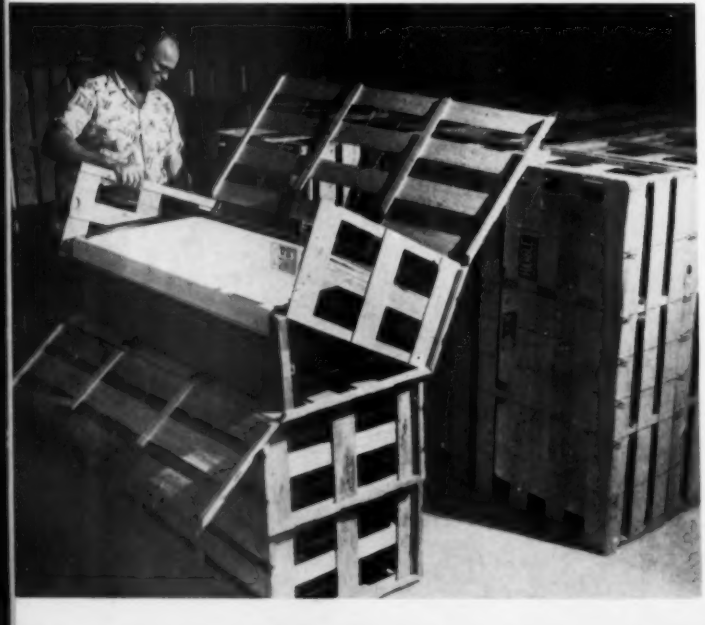
3. *The ends of the wirebound crate are attached to one section of the wrap-around blank by slipping the looped ends of their binding wires through pre-cut slots and then folding them.*

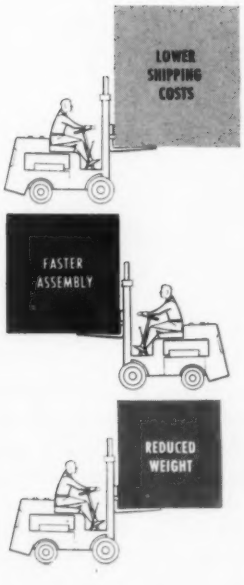


4. *With the crate wrapped around the bathtub, except for one side, cartoned accessories are placed in the crate in front of tub and pre-cut wood blocking is slipped between end of crate and tub.*

No matter where they're bound

SHIP THEM WIREBOUND !

and Stack 'em High As You Like



Modern handling methods call for quick and easy storage—in a minimum of space. The special Wirebound construction of strong steel wire and light, tough wood suits itself to modern methods of materials handling. You stack 'em fast, efficiently and high as you like. Shown above are some high-stacked Wirebound pallet boxes that are used for inter-plant shipments and parts storage. No other container is so perfectly suited to fork truck handling. They appeal to economy-minded management. We will be pleased to give you all details on versatile Wirebounds, regular or pallet boxes and crates.

MAIL THIS COUPON NOW!

Wirebound
BOXES & CRATES

WIREBOUND BOX MANUFACTURERS ASSOCIATION
Room 1154, 327 South LaSalle Street, Chicago, Illinois

- ☐ Have a sales engineer give me the whole story
- ☐ Send me a copy of "What to Expect from Wirebounds"

Name_____

Firm Name_____

Address_____

City, Zone and Sate_____

New Supplies and Equipment

F-10 Agitator

New The Unimixer Agitator is available in 1 through 5 horsepower sizes. Geared or direct drives can be specified with centripoise propellers or multi-purpose turbines. Well suited for mixing, stirring, blending, coloring, thinning and tinting, dissolving, aerating, absorption of gases and suspension of solids, the unit can handle liquids up to 2000 centipoises in viscosity, and products containing semi-solids to be dissolved or otherwise processed.

The pedestal and drive are of integral design. Heavy duty anti-friction thrust bearings are widely spaced on the shaft. The output shaft is extra heavy to take care of side thrust and bending stresses.

Noteworthy features include positive elimination of oil leakage around the shaft; and ease of interchanging the lower anti-friction bearing with a combination pressure type stuffing box with oil-less bronze bearing.

More Information

For more information on new supplies, equipment and literature reviewed here, fill out the order form, or write to us on your company stationery.

F-11 New circuit protectors

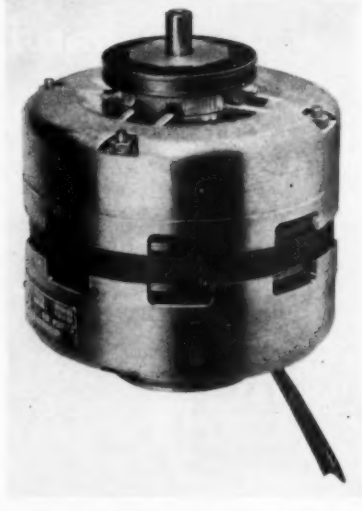
New A revolutionary new development in circuit protection for home appliances has been announced . Two circuit protectors, the Mini-Breakers MP-252 (for primary circuit safety) and the MP-600 (for protection of secondary circuits), when installed in a unit, furnish the manufacturer of home electrical appliances with a bonus selling feature.

Both circuit protectors are engineered for single-hole mounting for high-speed application; terminals are made to fit AMP Faston or connectors of similar design. The MP-252 furnishes permanent push-button protection for 15, 20 and 30 ampere units . . . the MP-600 for 4 to 30 ampere circuits.

Manual reset and trip-free operation are standard features. Appliances are positively protected against excessive overloads and short circuits. Service can normally be restored (after harmless overloading or "shorts") within ten seconds; yet the MP-252 and the MP-600 will not maintain a circuit that has not been cleared.

F-12 New induction motor

New A distributed wound induction motor, designed for business machines, dictating machines, facsimile equipment, tape recorders and other commercial and military applications, has been announced. Rated 1/8 to 1/100th H.P., Model D7302 is made with a precision die cast zinc housing to assure perfect bearing alignment and air gap concentricity. The motor is available in 2, 4, 6, 8 and 12 pole versions, single and dual speed combinations in standard induction and synchronous types.



Electrical and mechanical features are: low WOW, low flutter, low external field, extremely low temperature rise, well balanced magnetic circuit, ball bearings or sleeve bearings, double and forced ventilation, resilient or end mounted, light weight and compact and rugged.

F-13 Self-cleaning pressure filter

New A self-cleaning pressure filter for de-sludging and clarifying phosphate solutions so that proper phosphate coating of metal parts takes place has been announced. The new filter is designed to keep phosphate solutions clear and thereby lower chemical costs, prevent production tie-ups, and reduce maintenance. Use of the filter is intended to reduce de-sludging and tank cleaning to a once-a-year task; decrease maintenance by eliminating the need for cleaning and replacement of nozzles, pumps, headers and risers; and all but do away with tack wiping as only clear solution comes in contact with the part being treated. Operating at pressures from 10-125 PSI, the unit can be permanently installed or mounted on a portable platform.

F-14 Heat resisting stove grid enamel frits

New A new frit, No. 1625, made especially for stove grids, is now available. This new cast iron leadless clear frit gives beautiful, smooth texture results, yet has remarkable durability. It will resist not only direct flames, but also extreme thermal shock. The wide variety of pastel colors that are now available in addition to the conventional black, are secured by grinding the coloring oxides directly with the frit. It is said to be the most economical finish for grids, as well as the most durable, retaining its original beauty for many years under normal service conditions.

F-15 Pre-anodized aluminum in coils

New Continuous lengths of pre-anodized high purity aluminum in coils available in gold, silver and other brilliant colors and in qualities which will take stamping, piercing, forming and drawing without destroying its high lustre finish. This metal features other properties such as: corrosion resistant together with high chemical resistance; extra-ordinary surface hardness and resistance to abrasion; good adhesive capability; high light reflection; excellent decorative lustre.

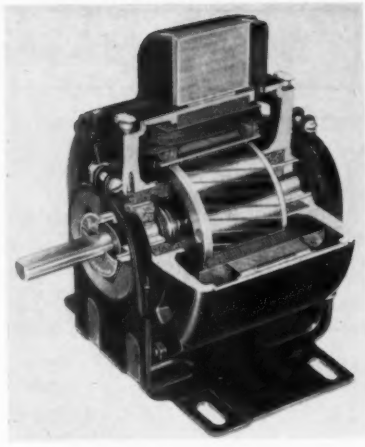
It eliminates the necessity of anodizing finished products. It is available in coils of any thickness from .002 inches to .020 inches and in coil widths from a fraction of an inch to 18 inches in normal runs and up to 24 inches in special runs.

F-16 New miniaturized indicator lights

New In keeping with the trend toward miniaturization of electrical components a new line of miniature neon indicator lights for some appliances and other applications has been developed. The lights are not only the smallest complete assemblies now available, but are also the lowest in cost. They can be supplied with wire leads or blade-type quick disconnects, and built-in resistors eliminate the need for transformers or series hook-ups. A wide range of lens colors and configurations is available, and special shapes in the form of company trademarks or other devices can be produced on volume orders.

F-17 Motor for direct drive applications

New Heating, ventilating, and refrigerating appliances are now being equipped with direct drive blowers powered by this new motor.



The motor incorporates several design advantages such as no starting switches or relays, low starting current, low running current, high power factor, high efficiency, and gradual torque build-up. It is also suitable for multi-speed operation, and any-position mounting.

The motor stator is a UNI-CAST construction. This means the frame is die cast under high pressure to prevent shifting and vibration of laminations during manufacturing, handling, and motor use. Completed core, end bells, bearings, and shafting are precision machined to insure the quietest operation and long life. The desirability of this motor for direct drive blower applications in larger sizes is found in the economy of eliminating the cost of belts, blocks, pulleys, shafting, and motor mount in conventional blower installations. It is available in sizes from 1/10th to 1/3 horsepower.

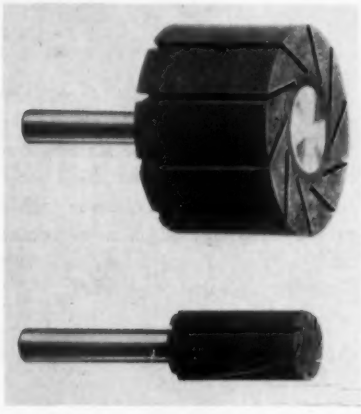
F-18 Abrasive wheel

New Neoprene rubber permanently bonded to a cast aluminum wheel under tremendous heat and pressure, provides industry with a new and effective entry in the abrasive wheel field. It is designed to perform equally well the four basic abrasive functions of grinding, sanding, polishing, and deburring. It is effective on metal, plastic and rubber. Chipping, grooving, and exploding problems are said to be ended with this wheel and a special locking device ends abrasive cloth fly-off.

New Industrial Literature

601. Slotted rubber expanding grinding wheel

New This new wheel is said to cut down on shop costs and save valuable production time by its ease of operation and its ability to get all the usable life out of each abrasive band or sleeve. No spindle nuts to tighten, no tools necessary.



Just slip it on. The centrifugal force exerted by the wheel holds the abrasive element with no possibility of slipping — and replacement is made in a matter of seconds. These wheels are offered in a variety of sizes from ½" to 8" diameters. Sizes up to 2" diameter are available with ¼" mandrels. Larger sizes available in arbor hole type only.

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602. "Equipping the Pickle House"

New This booklet is designed as a practical guide to greater production at lower cost in a wide variety of pickling operations. The 32 page, two-color booklet describes the use of specially designed equipment in the processing of large and small fabricated parts, hollow ware, and forgings and castings, as well as the common mill forms of steel and tin plate. A number of diagrams and a table of link specifications showing safe loads for chain are also included.

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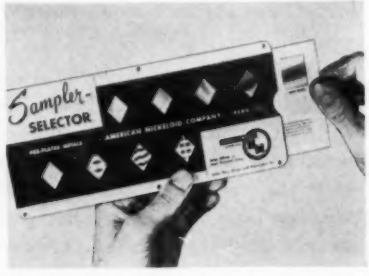
603. Sampler Selector

New Specifications, properties and typical uses for 14 finish-to-base metal combinations of pre-plated metals are correlated on a new metals Sampler-Selector. In pocket-size, slide-chart form it tells at a glance the following technical data: base metal; plated surfaces; sizes of sheet; coiled strip; flat strip; gauges; tempers; properties; typical uses.



The handy guide to design and production with pre-finished metals also features eight samples of metals with these finishes and patterns: bright chrome, satin nickel, bright copper, satin brass, ¼" horizontal stripe, diagonal crimp, square crimp, ⅛" diamond stripe. According to the company it is being introduced to simplify pre-design selection of pre-plated metals and to help the production engineer plan fabrication short-cuts and handling economies. It may be obtained by request on your company letterhead.

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604. Collapsible reusable wooden pallet box

New These pallet boxes are custom built to fit users-requirements. Can be used for transporting materials from production station to station in the plant, also as storage with and without racks. The front window insert can be removed and box used as a bin for filling mail-order orders. A complete booklet featuring various uses of pallet boxes available upon request.

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605. "A Better Bond For Organic Finishes"

New This folder describes in detail the companies' complete line of phosphating compounds. In addition to a general discussion of phosphating, metal treatment prior to painting and metal treatment prior to other organic finishing, the brochure includes a "Phosphating Reference Chart". This chart outlines the purpose of each material, the recommended uses, Government specifications met, methods of application, equipment requirements, metals to be used on, coating weights and complete operation cycle.

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606. Technical finishing bulletins

New Technical bulletins on dip tank and flowcoat finishing have just been prepared. The eight-page, illustrated bulletins describe the processes, discuss advantages and disadvantages of the two finishing techniques. Size and shape of dip tanks, methods of dipping, hanging of the ware, methods of agitation, tank control, as well as general suggestions and precautions are treated in the dip tank bulletin. The flowcoat brochure includes sections on limitations of flowcoating, operating variables, surface preparation, primers, topcoats, and thinners.

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607. Motor buying information

New A new 28-page catalog of buying information on a-c motors is available. Designated GEC-1026, the bulletin presents complete buying information on standard a-c fractional and integral horsepower motors in most general use. Included are general and definite purpose fractional horsepower motors, and fhp gear motors.

A special section on the selection of integral horsepower motors covers

horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications include single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors.

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608. Coated Abrasives film

New "Coated Abrasives Belts Speed Metalworking Production" is a 27-minute sound and color close-up (104 application scenes) of the newest finishing developments in the fast moving coated abrasives technology. The methods, machinery and product applications shown will give the viewer an up-to-date problem and solution session aimed at cutting finishing cost per piece. Applications range from off-hand contour and standard lathe work but concentrate mostly on semi-automatic and automatic operations. Work materials include ferrous, non-ferrous and non-metallic; shapes include contour, cylindrical, flat and sheet products. Film prints are available to foremen groups, plant production training classes, technical societies and college engineering and trade groups.

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609. Large self-sticking signs

New Self-sticking accident prevention signs in three standard sizes are now available. The signs include both basic purpose signs and specific purpose signs.

Basic purpose accident prevention signs include danger, caution, information, directional, safety instruction and radiation hazard signs in wordings and colors specified by ASA standard Z-35.1-1941.

Each sign comes mounted on its own individual dispenser card. Unskilled personnel can apply them without tools, screws, nails or bolts. Just peel from card and apply. These signs stick without moistening to any clean, dry surface. Write for new 16-page, full color bulletin.

---

610. Finishes for aluminum

New A comprehensive and informative description of the innumerable ways in which the appearance and performance characteristics of aluminum can be changed is presented in a new four-color book. This 48-page book demonstrates the versatility of aluminum in presenting the myriad of colors and appearances which make aluminum the metal with a thousand faces. An outline of finishing methods makes up a major portion of the book, and illustrates the application of specific finishes to products and structures.

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611. "Branded For Life"

New This booklet is sent out in answer to product inquiries and explains in detail how Metal-Cals may be used for quick, economical trademarking, serial numbering, service labeling, catalog and parts numbering and dial and gauge marking. In addition to telling what Metal-Cals are and how they may be ordered, and demonstrating practical applications of the plates, the new booklet contains a montage layout of typical Metal-Cals.

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612. Brochure on wirebound crates

New Impressive "King-Size" wirebound crates, now effectively used in shipping machine tools and other big heavy products,

are described in a new brochure issued recently. The colorful, highly illustrated booklet shows how engineered wirebound containers are economically used to replace costly custom-built crates in the packing and shipping of equipment weighing up to several tons.

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613. Steelweld single-point press catalog

New A new catalog has just been printed covering the new line of Steelweld Single-Point Presses. These machines range in size from 150 tons and up.

FINISH
York Street at Park Avenue
Elmhurst, Illinois

Please forward to me at once information on the new supplies and equipment and new industrial literature as enumerated below:

No._____ **No.**_____ **No.**_____ **No.**_____

No._____ **No.**_____ **No.**_____ **No.**_____

Name _____ **Title** _____

Company _____

Company Address _____

City _____ **Zone**____ **State** _____

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Editor's mail

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best interests of Commerce, Industry, Government, and particularly our respective members, can be served if such a merger can be brought about. There are many good reasons, too numerous to mention here, as to why such action would be good for all parties concerned. Suffice it that one of the principal benefits would be the achievement of a united front in the furtherance of scientific packaging and materials handling as modern management practice.

It should be remembered, however, that there are certain basic differences in the character and policies of these two national organizations. We believe, however, that these differences, fairly and impartially considered, can be equitably resolved. . .

Earl B. Candell
President of SIPMHE
Chicago, Illinois

MILLER NAMED MANAGING DIRECTOR OF NEMA

The appointment of Joseph F. Miller as managing director of the

National Electrical Manufacturers Association has been announced by A. F. Metz, president. Miller, who has been assistant managing director since 1954, succeeds William J. Donald, who has retired after 21 years of service as managing director.

In addition to his association activities, Donald has been active in the U.S. Chamber of Commerce, the National Industrial Conference Board, and the Advisory Council on Federal Reports.